Jestr

Journal of Engineering Science and Technology Review 7 (2) (2014) 182– 189

JOURNAL OF
Engineering Science and Technology Review

www.jestr.org

Research Article

A survey of buckling of conical shells subjected to axial compression and external pressure

O. Ifayefunmi

Faculty of Mechanical Engineering, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, MALAYSIA

Received 4 March 2014; Accepted 15 July 2014

Abstract

The paper reviews literature on buckling of conical shells subjected to three loading conditions: (i) axial compression only, (ii) external pressure only and (iii) combined loading. The review is from the theoretical as well as experimental points of view. This review covers known experiments on cones from (1958 – 2012). The literature review is split thematically into the following categories: theoretical prediction of axially compressed cones, theoretical prediction of externally pressurized cones, theoretical prediction of cones under combined loading, buckling experiments on axially compressed cones, buckling experiments on externally pressurized cones, buckling experiments on cones subjected to combined loading, buckling experiments on composite conical shells, equivalent cylinder approach, effect of initial geometric imperfection on the buckling behaviour of cones and effect of imperfect boundary conditions on the buckling behaviour of cones.

Keywords: buckling, conical shells, axial compression, external pressure, combined loading, literature review, equivalent cylinder, initial geometric imperfection, imperfect boundary conditions.

1 Introduction

Conical shell structures are used as structural components in engineering applications within aeronautical, marine, offshore and mechanical industries. They find applications in pressure vessels, pipelines, offshore platforms, and transition elements between cylinders of different diameters. Thin conical shell structures are primarily used in aeronautical applications where the load carrying capacity is usually limited by elastic buckling due to their high value of the radius-to-thickness ratio. Thicker shell structures of low values of the radius-to-thickness ratio, typically used in marine and offshore applications, usually buckle or collapse in the elastic-plastic or plastic range.

In practice, conical shells are subjected to various loading conditions such as external pressure, internal pressure, axial compression, bending, torsion, etc., or combined loading, i.e., axial compression and torsion, axial compression and external or internal pressure, torsion and external pressure or internal pressure, etc. Instability of this structural element is one of the factors that limit the extent to which the structures can be loaded or deform. As a result, stability behavior needs to be considered in their design analysis. For a designer to successfully carry out buckling analysis of conical shells, it is important to carefully study and understand the behavior of the shell structure. This technical challenge has spawned significant research in the areas of the mechanical behavior of cones subjected to different loading conditions.

Conical shells resemble cylindrical shells in their structural behavior, and this includes buckling. Due to the complexity in deriving the equations for conical shells, the concept of equivalent cylinder was introduced. The concept of equivalent cylinder was independently introduced by Tokugawa [1]. Tokugawa assumed the meridian of the shell to be a beam, simply supported at each ends and loaded by linearly varying pressure. Since the maximum deflection occurs at around the middle of the beam he proposed the analysis of the conical frusta to be based on an equivalent-cylinder with the radius equal to the radius of curvature of the cone at this maximum deflection point.

The structural efficiency of the cones can be improved by stiffening them. This usually increases the strength of the conical shells against structural instability. In Ref. [2], it was argued that the buckling resistance of a long thin-walled circular cylinder or cone that was not stiffened, under uniform external pressure was extremely poor. The most commonly used stiffener in conical shells is the ring reinforcement.

This paper presents a comprehensive representation of different work that has been carried out on the buckling behavoir of cones subjected to axial compression and/or external pressure.

2. Buckling of conical shells under various loading conditions

2.1 Theoretical prediction of axially compressed cones

Seide [3, 4] first derived an expression based on Donnell-type shell theory for the critical buckling load for an

* E-mail address: olawale@utem.edu.my
ISSN: 1791-2377

axisymmetric mode in a conical shell subjected to axial compression. Seide's formula may be written as:

$$F_{crit} = \frac{2\pi Et^2 \cos^2 \beta}{\sqrt{3(1-\nu^2)}} = F_{cyl} \cos^2 \beta \qquad (1.1)$$

Thus, the critical buckling load of a cone is the same as that of a cylinder multiplied by the square of the cosine of the cone semi-vertex angle. Using Galerkin method for asymmetric buckling mode, Singer [5], also obtained the same magnitude of buckling load as given by Ref. [3]. The effect of prebuckling deformation on the buckling of a clamped truncated cone under axial compression has been presented in Refs [6, 7]. In 1970, two independent research works, by Tani and Yamaki [8] and by Baruch et al [9], considered the influence of boundary conditions on the buckling strength of cones subjected to axial compression. Results from both investigations were in good agreement. Chang and Katz [10], in their review of the buckling of conical shells under axial compression, concluded that the buckling strength is mainly dependent on the condition of the smaller end of the cone. Plastic buckling of axially compressed truncated cones was presented in Ref. [11]. In Ref. [12] a theoretical model was developed to predict the mean static axial load required to collapse circular cones and frusta in the concertina form of axisymmetric deformation. Report on the buckling behavior of stiffened cones under axial compression can also be found in Refs [13-15].

2.2 Theoretical prediction of externally pressurized cones

Some of the earliest analyses of stability of conical shells under external pressure are given in Refs [16, 17]. Taylor [18], derived a more accurate expression for the total potential energy and presented an approximation two term solution for complete cone. In Ref. [19], a simplified set of differential equations was derived for the buckling of truncated cones having small angle. A solution, not restricted to small cone angle, was obtained in Ref. [20] where modified Rayleigh-Ritz method for slightly different boundary conditions was adopted. This approximation curve was similar to that obtained by Singer [21] with relaxed boundary conditions for loading under hydrostatic pressure and lateral pressure varying in the axial direction. However in both of these works, the calculations do not include larger cone angles. Singer [22] indicated that for larger cone angles, the single curve should be replaced by a family of curves. Results of the analysis of reinforced cone-cylinder intersection are presented by Wenk and Taylor [23, 24]. Reference [25] provides a step-by-step numerical procedure for estimating stresses and strains in conical shell structures. Baruch and Singer [26], based on Donnell type equilibrium, derived stability equations for stiffened thin cones under hydrostatic pressure.

2.3 Theoretical prediction of cones under combined loading

Investigation into the theoretical analysis of elastic stability of stiffened and unstiffened conical shells subjected to combined loading acting simultaneously can be found in Refs [27-34]. In Refs [27, 28], a theoretical method was developed and based on modified Donnell type stability equation for analyzing the buckling of thin conical shells under combined torsion and external or internal pressure. In Ref. [29], the analysis covered cones under combined external pressure, torsion and axial compression. Refs [27, 29] consider isotropic cones. Moreover, the study of truncated cones under combined axial compression and external pressure was presented in Refs [30, 31]. Radkowski [30], gives the design criteria for the elastic instability of thin cones, whereas in Ref. [31] energy method was used to solve the classical eigen-value problem of truncated cones. Finite difference method solution of Donnell type shell equation was obtained for truncated cones under combined pressure and heating, [32]. Similarly, the case of combined axial load, pressure and heating is discussed in Ref. [33]. Approximate formulae for the elastic-plastic buckling of geometrically perfect cones subjected to axial compression, hydrostatic external pressure, or to combined action of axial compression and internal pressure can be found in Ref. [34]. These expressions have been derived using extensive parametric studies with no experiments.

2.4 Buckling experiments on axially compressed cones

In 1961, Lackman et al [35], presented early experiments on elastic buckling of conical shells subjected to axial compression. Two sets of nickel specimen having cone angle of 20 and 40 degree, and having constant wall thickness, were tested using Olsen Universal testing machine. A similar experiment is described in Refs [36, 37] by Weingarten et al on Mylar and welded steel cones under axial compression. Arbocz [38], investigated the effect of cone angle and initial axisymmetric imperfections on the elastic buckling load of cones under axial compression. Details about experimental data on conical shells made by copper electroforming process can be found in Ref. [38]. Reference [39], details experiments on elastic buckling behavior of high quality epoxy cones and the techniques of manufacture. In addition, El-Sobky et al [40], carried out experiments on buckling of compressed aluminium frusta, when subjected to axial load for the case of different end conditions. One of the earlier studies of plastic buckling of steep truncated cones subjected to axial compression was conducted by Ramsey, [41]. The specimens were small 6061-T6 aluminium and 416 stainless steel with average radius to thickness ratio of 12 for aluminium shells and 10 for stainless steel shells. Mamalis et al [42-44], conducted a detailed experiment on the plastic collapse of conical shells made of different materials under axial compression. Specimens were made from aluminium Ref [42], steel Ref. [43], and from polyvinylchloride (PVC) Ref. [44]. Gupta and Easwara Prasad [45, 46], studied experimentally the plastic behavior of aluminium conical frusta for large cone angles under axial compression. Whereas, in Ref. [47], aluminium cones with smaller cone angle were investigated. The effects of rolling and stationary plastic hinge are discussed. Chryssanthopoulos et al [48], presented a report on the plastic collapse of unstiffened steel cones in compression. Five steel cones were tested. Results of experiments were compared with proposed plastic mechanism approach for predicting collapse load of axially compressed cone. Recent tests on the plastic collapse of axially compressed unstiffened steel cones are provided in Refs [49, 50]. Ref. [49] is devoted to unstiffened thick cones with cone angle of 14 degree, while Ref. [50] covers unstiffened thick cones with cone angle of 26.56 degree. In both references, two cones were tested in each case. Cones were computer numerically controlled (CNC) machined from a solid steel billet. Experiments carried out on the elastic buckling of 29 integrally ring-stiffened thin steel cones subjected to axial compression are discussed in Refs [51-53]. Cones were fabricated from alloy steel by hydro-spinning process. The ring stiffener was machined from shear-spun blank by turning. Different ring stiffener configurations on cone with varying thickness and taper ratio were considered. Though, the most commonly used reinforcement type is the ring-stiffener, the importance of using meridional stringer for axially compressed cones were studied in Ref. [54].

2.5 Buckling experiments on externally pressurized cones

The earliest tests on buckling of conical shells subjected to external pressure were those carried out by Tokugawa [1]. Other early tests on cones subjected to external pressure can be found in Refs [55, 56]. Singer et al, [57-59] conducted a series of tests on cones subjected to external pressure. In Ref. [57], the elastic instability of aluminium cones with different cone angle was examined. Similar experiments were carried out using nickel conical shells produced by electroforming over the same aluminium mandrel as reported in Refs [58, 59]. Moreover, in Ref. [60], detailed experiments on the elastic buckling of steel cones under external pressure were presented. Experiments on plastic collapse of three aluminium cones under external pressure are reported by Ross et al [61]. A review of testing techniques for applying external hydrostatic pressure to buckling of shells is presented in Ref. [62]. In Refs [49, 50], experiments on the plastic buckling of externally pressurized unstiffened steel cones are presented. Ref. [49] is devoted to unstiffened cones with cone angle of 14 degree, while Ref. [50] covers unstiffened cones with cone angle of 26.56 degree. Two cones were tested in each case to confirm repeatability of experimental data.

Some of the earlier experiments on reinforced cones under external pressure can be found in Refs [63-65]. Refs [63, 64] present details about experiments on steel conical reducers between cylindrical shells. The plastic buckling strength under hydrostatic external pressure was investigated at David Taylor Model Basin. The general instability of ring stiffened mild steel cones under hydrostatic pressure is reported in Ref. [65]. Similarly, the report on the elastic buckling of ring-stiffened cones subjected to external pressure can be found in Refs [66, 67]. Shells were made from magnesium or cast-epoxy. Ross [68-76] carried out a comprehensive experimental tests of the buckling behavior of ring stiffened thick mild steel cones under external pressure. He proposed a method for calculation of the theoretical elastic buckling pressure for a perfect cone, together with the thinness ratio. During this series of tests, shells with different stiffener spacing, stiffener geometry and varying shell thickness with different taper ratio were investigated. Barkey et al [77] at Sandia National Laboratory studied the buckling behavior of thin-walled truncated cones made from ASTM 1008 steel. Cones were subjected to external pressure and formed a study into the structural integrity of a fusion related component.

2.6 Buckling experiments on cones subjected to combined loading

Elastic buckling of conical shells subjected to simultaneous action of two or more load has been studied in the past. Experiments on instability of cones were presented for conical shells under combined torsion and internal or external pressure in Refs [78, 79]. In Ref. [78], Mylar cones were tested, under combined internal pressure and torsion, and interaction curve was presented in this case. Equal and opposite loads, monitored by a load cell, were applied by a cable to the ends of the loading beam attached to the upper plate. Measurements of the angle of twist of the loaded end plate were obtained by means of two differential transformers. Singer and Eckstein [79], presented results on instability of cones under combined action of torsion and external pressure. Tests on Alclad, stainless steel and aluminium alloys were investigated. Tests under combined loading were carried out in two different ways: (a) going up to a predetermined pressure, and then keeping it constant, while torque was applied till the shell failed, or (b) similarly, only with torque instead of pressure being kept constant. It was reported that the two procedures yielded fairly close results. References [80, 81] discuss experiments on cones under combined torsion and axial compression or tension. In order to determine the shape of the interactive curve for cones under combined torsion and axial compression, Berkovits and Singer [80] presented a result indicating a parabolic interaction function between torsion and compression of unstiffened alclad 2024-T3 aluminum alloy cones. Tests under combined loading were conducted in a similar way as in Ref. [79], i.e., applying axial load, and keeping load constant, followed by the application of torsion until the specimen failed, and vice versa. Buckling experiments for Mylar cones under combined torsion and axial compression is reported by MacCalden and Matthiesen [81]. A similar study on Mylar cone subjected to combined external pressure and axial compression was presented in Ref. [82]. Results for Mylar cone under combined internal pressure and axial compression can be found in Ref. [37]. In Ref. [83], scaled-down models of inner vessel consisting of two cylindrical shells connected by conical and torus shells were tested under combined internal pressure and axial compression. The specimen was made up of stainless steel. Berkovits et al [84], presented results of their experimental program on the elastic buckling of alclad 2024-T3 aluminum alloy cones under axial compression, torsion and external pressure or internal pressure in order to determine their interactive curves. Experimental test rig which was originally equipped for simultaneous application of axial compression and torsion as in Ref. [80] was modified. Experiments on the plastic buckling of short and relatively thick unstiffened truncated mild steel cones subjected to combined axial compression and external pressure can be found in Refs [85-88]. In Refs [85-87], thirteen conical specimens with cone angle 26.56 degree were tested. Tests under combined loading were conducted in a similar way as in Ref. [79], i.e., applying axial load, and keeping load constant, followed by the application of pressure until the specimen failed, and vice versa. Whereas, in Ref. [88], ten cones with cone angle 14 degree were tested. For test under combined loading, cones were subjected to simultaneous application of axial compression and external pressure.

A special case of conical shell structures subjected to combined loading i.e., liquid-filled conical shells supported from below, was reported by Vandepitte et al in Refs [89-92]. Refs [89-91], reports on elastic buckling of liquid-filled conical shells supported from below. Report on elastic-plastic buckling under external pressure was presented in Ref. [92].

Details about elastic buckling of stiffened cones under combined loading can be found in Refs [93, 94]. In Reference [93], the buckling behaviour of isotropic conical shells under combined torsion and external pressure or internal pressure was analysed. More attention was devoted to ring stiffened cones made from aluminium and from steel subjected to various single loads that made up the combined loading, e.g., torsion and external pressure. Reference [94], reports on experiments carried out on reinforced steel cones under combined action of torsion and axial compression. The test included three shells tested under torsion and combined loading of torsion and axial compression, and another four shells were tested under axial compression, only.

2.7 Buckling experiments on composite conical shells

The buckling behavior of orthotropic composite and layered sandwich conical shells subjected to various loading conditions can be found in Refs [95-99]. Bert et al [100, 101] conducted an extensive experimental study on the buckling behavior of cylindrical and conical sandwich shells made from glass/epoxy fiber facings and aluminium alloys honeycomb cores. The specimens were: 1.12m diameter cylinder and truncated cone with a large diameter of 1.47m. In Reference [102], experimental investigations were carried out on the buckling behavior of carbon-fiber-reinforced plastics (CFRP) and glass-fiber-reinforced plastic (GFRP) filament-wound conical shells subjected to axial compression. The specimens were 328mm diameter at the big end, with r_2/t ranging from 75 to 162. The cones were fabricated using the horizontal helical filament winding machine and a stainless steel mandrel. Similarly, Ref. [103] examined the effect of cylindrical part length on the crushing behavior of cone-cylinder-cone intersection in composite shells. The cylindrical part length varied between 0 and 50mm. Glass/epoxy and carbon/epoxy filament-wound laminated cones were fabricated by wet filament-winding process. The specimens had two diameters equal to 98.2mm and 112.8mm at the big end of the cone.

2.8 Equivalent cylinder approach

Due to the complexity in deriving the equations for conical shells, the concept of equivalent cylinder was introduced. The concept of equivalent cylinder was independently introduced by Tokugawa [1]. Tokugawa assumed the meridian of the shell to be a beam, simply supported at each ends and loaded by linearly varying pressure. Since the maximum deflection occurs at around the middle of the beam he proposed the analysis of the conical frusta to be based on an equivalent-cylinder with the radius equal to the radius of curvature of the cone at this maximum deflection point. Hoff [104] in 1955, showed that by neglecting certain terms in the expression for middle surface strain and curvatures of a deformed conical shells, a set of equations that reduces to Donnell's equation for cylindrical shells in the limits could be obtained. Seide [105] in 1956 derived an equation for bending and buckling of circular conical shells under arbitrary loading. When the cone semi-vertex angles become very small the equation reduces to Donnell's equation for thin cylindrical shells. The minimum radius of curvature of the middle surface approaches a constant value. It was shown in [104] and [105] that the system of Donnell-type equation for cones and equation for cylinder could be obtained from minimizing the potential energy expression. In 1959, Seide [20] used the potential energy expression from [105] for circular conical shells in conjunction with a slightly modified Rayleigh-Ritz method to obtain results for buckling of conical shells under hydrostatic external pressure which is similar to that given by Batdorf [106] for circular cylinder. Similarly in 1956, Seide [3] obtained a simple expression for long cone of constant thickness subjected to axial compression.

The equivalent cylinder approach has also been linked to the buckling of cones under axial compression or external pressure, Ref. [107]. This philosophy has been adopted by all of the design codes [108-111]. Design codes [108-110] propose the use of equivalent cylinder for cones under external pressure on the basis of Niordson's result [17], as one having a length equal to the slant length of the cone, $L_{eq} = L$, a radius equal to the average radius of curvature of the cone, $\rho = (r_1 + r_2)/2\cos\beta$ and the same thickness as the cone, $t_{eq} = t$. For cones under axial compression, the design code formulations differ in the definitions of the radius of curvature of equivalent cylinder. According to API recommendations [108] and DIN [109], the buckling load should be calculated for equivalent cylinder with ranges of curvature values, ρ, ($r_1/\cos\beta \leq \rho \leq r_2/\cos\beta$). However it is stated in API recommendations that the use of the radius at the small end of the cone will be conservative. According to ECCS recommendations [110] the radius of curvature of the cone at the axial coordinate ($r_1/\cos\beta$) should be used. In DnV standard [111], the mean radius of curvature of the cone should be used as $(r_1 + r_2)/2\cos\beta$.

An approximate formula for the design of unstiffened cones was presented by Finzi and Poggi [112]. The choice of radius of equivalent cylinder was given as ($r_1/\cos\beta$) for cones under axial compression and $(r_1 + r_2)/2\cos\beta$ for cones under external pressure. The mean radius of cone, $(r_1 + r_2)/2$ was also suggested for calculating the imperfection reduction factor for cones under axial compression. In Ref. [113], more extensive design formulas for static buckling strength of cones under axial compression were presented. The full ranges of behavior from short to long cones are covered. In Ref. [114], experiments were conducted to re-examines the concept of equivalent cylinder for: (i) elastic-plastic buckling of axially compressed cones and (ii) elastic-plastic buckling of externally pressurized cones. Two cylinders were tested. The first cylinder was subjected to axial compression only, while the second cylinder was subjected to external hydrostatic pressure.

2.9 Effect of initial geometric imperfection on the buckling behavior of cones

It is a general belief that the discrepancies between theoretical prediction of buckling load and the experimental failure loads of shell structures can be attributed to imperfections. Imperfection types outlined by Babcock [115] are a result of nonuniform shell thickness, nonuniform loading, inaccurately modeled boundary conditions, influence of prebuckling deformations and deviations from the perfect shell geometry. Reference [116] presents method for accurately determining the plastic collapse load of imperfect shell structures, e.g., for plates, cylinder and silo transition junction. This method was based on results from

FE analyses. The material was modeled to be elastic-perfectly plastic with Young's modulus, E = 200 GPa, Poisson's ratio, $\upsilon = 0.3$, and yield stress, $\sigma_{yp} = 250$ MPa. Three different examples were described, they are: (i) plate with uniformly distributed transverse pressure, (ii) cylinder with axisymmetric band load, and (iii) silo transition junction. This method has been evaluated using numerical studies with no experiments.

By far the most widely considered imperfection type is associated with the initial geometric imperfections. One of the first studies of the sensitivity of the structures critical load to initial geometric imperfections was carried out by Donnell and Wan [117]. Several investigations on the influence of initial imperfection can be found in Refs. [118-124]. In [119], the importance of conducting initial geometric measurements of shells was highlighted. This is equally important, with the advent of computerized analysis, to provide accurate data for numerical simulations. One of the most important parts of buckling experiment on shells is the extent of geometric imperfection measurement carried out before the experiment. A modern, semi-automated measurement technique for measuring shell imperfection was developed in Ref. [125]. The level of sensitivity of isotropic cones depends on the cone parameters, such as: the cone angle, the length to radius ratio (the longer the shell, the lower the sensitivity) and boundary conditions [126]. The initial postbuckling and imperfection sensitivity of anisotropic conical shells was examined in Refs [127, 128]. A widely used form of shape deviation in calculating imperfection sensitivity is the eigenmode imperfection. The buckling mode of a perfect shell is superimposed on the perfect shape of shell such as those seen in Refs [129-131]. In practice, most imperfections found in structures do not have the shape of buckling mode. Reference [132] presents result of a study of the effect of local imperfection (dimple) on the elastic buckling of axially compressed conical shells. The study into influence of initial geometric imperfections on buckling strength of truncated cones subjected to axial compression only, lateral pressure only and combined axial compression and external pressure is reported in Ref. [133]. The work was purely numerical and cones were assume to fail in the elastic-plastic range.

2.10 Effect of imperfect boundary conditions on the buckling behavior of cones

Very few studies have been carried out on the influence of boundary condition on the load carrying capacity of cones. They can be found in Refs [9, 79, 134-140]. In Refs [134-136], the effect of the possible in-plane boundary conditions on the buckling behavior of conical shells subjected to external pressure was studied. Also a method of analysis of the buckling of clamped conical shells was derived based on solution of modified Donnell-type stability equation, Ref. [137]. A similar effect was demonstrated experimentally in Ref. [79]. For cones under axial compression, axisymmetric buckling can lead to lower buckling loads for certain boundary conditions (simply supported out-of-plane, varying in-plane restraint) as pointed out in Ref. [9]. Also it was showed in Refs [138, 139] that at a certain aspect ratio of unstiffened conical shell, different buckling mode correspond to the same value of critical buckling load. The severity of influence of radial edge displacement constraints on the limit load for stiffened conical shells subjected to axial compression was presented in Ref. [140]. Numerical studies into the effect of imperfect boundary condition on the load carrying capacity of thick steel cones subjected to axial compression only and lateral external pressure only is presented in Ref. [133].

3 Conclusion

The literatures presented in this paper is by no means complete but it gives a comprehensive representation of different work being carried out on the subjects matter. The author wishes to apologize for the unintentional exclusions of missing references and would appreciate receiving comments and pointers to other relevant literature for a future update.

References

[1] T. Tokugawa, "Experiments on the elastic stability of a thin-wall cone under uniform normal pressure on all sides, and an approximate method for computing its collapsible pressure", in Congress of Applied Mechanics League, Zõsen Kyõkai (Shipbuilding Association), Miscellaneous Publications, 125, 1932, 151-169.

[2] C. T. F. Ross, "Pressure Vessels: External Pressure Technology", Horwood Publishing Ltd, Chichester UK, 2001.

[3] P. Seide, "Axisymmetrical buckling of circular cones under axial compression", Journal of Applied Mechanics, Transaction of ASME, 23(4), 1956, 625-628.

[4] P. Seide, "Buckling of circular cones under axial compression", Journal of Applied Mechanics, 28(2), 1961, 315-326.

[5] J. Singer, "Buckling of circular conical shells under uniform axial compression", AIAA Journal, 3(5), 1965, 985-987.

[6] S. Kobayashi, "The influence of prebuckling deformation on the buckling load of truncated conical shells under axial compression", NASA CR-707, 1967, pp. 1-41.

[7] J. Tani, "Influence of prebuckling deformations on the buckling of truncated conical shells under axial compression", Transactions of Japan Society for Aeronautical and Space Sciences, 16(34), 1973, 232-245.

[8] J. Tani, N. Yamaki, "Buckling of truncated conical shells under axial compression", AIAA Journal, 8(3), 1970, 568-571.

[9] M. Baruch, O. Harari, J. Singer, "Low buckling loads of axially compressed conical shells", Journal of Applied Mechanics, Transactions of the ASME, 37(2), 1970, 384-392.

[10 C. H. Chang, L. Katz, "Buckling of axially compressed conical shells", Journal of Engineering, Mechanics Division, 106(3), 1980, 501–516.

[11 H. Ramsey, "Contrast between elastic and plastic buckling of axially compressed conical shells with edge constraint", International Journal of Mechanical Sciences, 20(1), 1978, 37-46.

[12] A. G. Mamalis, D. E. Manolakos, S. Saigal, G. L. Viegelahn, W. Johnson, "Extensible plastic collapse of thin-wall frusta as energy absorbers", International Journal of Mechanical Sciences, 28(4), 1986, 219-229.

[13] L. Tong, B. Tabarrok, T. K. Wang, "Simple solutions for buckling of orthotropic conical shells", International Journal of Solids and Structures, 29(8), 1992, 933-946.

[14] A. Spagnoli, M. K. Chryssanthopoulos, "Buckling design of stringer-stiffened conical shells in compression", Journal of Structural Engineering, 125(1), 1999, 40-48.

[15] A. Spagnoli, M. K. Chryssanthopoulos, "Elastic buckling and postbuckling behaviour of widely-stiffened conical shells under axial compression", Engineering Structures, 21(9),1999, 845-855.
[16] A. Pfluger, "Stability of thin conical shells", Ingenieur Archiv, 8(3) 1937, 203-218.
[17] F. I. N. Niordson, "Buckling of conical shells subjected to uniform external lateral pressure", Transaction of the Royal Institute of Technology, Stockholm, Sweden, 27(10), 1947, 1-22.
[18] C. E. Taylor, "Elastic stability of conical shells loaded by uniform external pressure", in Proceedings of the Third Mid-Western Conference on Solid Mechanics, University of Michigan, 1957, pp 86.
[19] N. J. Hoff, J. Singer, "Buckling of circular conical shells under external pressure", in Proceedings of the International Union of Theoretical and Applied Mechanics, Symposium on the Theory of Thin Elastic Shells, Delft, Holland, 1959, pp. 363-388.
[20] P. Seide, "On the buckling of truncated conical shells under uniform hydrostatic pressure", in Proceedings of the International Union of Theoretical and Applied Mechanics, Symposium on the Theory of Thin Elastic Shells, Delft, Holland, 1959, pp. 363-388.
[21] J. Singer, "Buckling of circular conical shells under axisymetrical external pressure", The Journal of Mechanical Engineering Science, 3(4), 1961, 330-339.
[22] J. Singer, "Correlation of the critical pressure of conical shells with that of equivalent cylindrical shells", AIAA Journal, 1(11), 1963, 2675-2676.
[23] E. Wenk Jr., C. E. Taylor, "Analysis of stresses at the reinforced intersection of conical and cylindrical shells", David Taylor Model Basin, Report 826, 1953, pp. 1-22.
[24] C. E. Taylor, E. Wenk Jr., "Analysis of stress in the conical elements of shell structures", David Taylor Model Basin, Report 981, 1956, pp. 1-11.
[25] V. Richard, J. G. Pulos, "A procedure for computing stresses in conical shell near ring-stiffness or reinforced intersection", David Taylor Model Basin, Report 1015, 1958, pp.1-33.
[26] M. Baruch, J. Singer, "General instability of stiffened circular conical shells under hydrostatic pressure", The Aeronautical Quarterly, May 1965, pp. 187-204.
[27] J. Singer, M. Baruch, "Buckling of circular conical shells under combined torsion and external or internal pressure", in Topics in Applied Mechanics, D. Abir, F. Ollendorff, M.Reiner, (eds), Elsevier Publishing Company, Amsterdam, 1965, pp. 65-88.
[28] J. Singer, R. Fersht-Scher, A. Betser, "Buckling of orthotropic conical shells under combined torsion and external or internal pressure", Israel Journal of Technology, 2(1), 1964, 179-189.
[29] J. Singer, A. Eckstein, M. Baruch, "Buckling of conical shells under external pressure, torsion and axial compression", TAE Report 19, 1962.
[30] P. P. Radkowski, "Elastic instability of conical shells under combined loading", NASA TN D-1510, 1962, pp. 427-440.
[31] Farshid Sadr-Hashemi, "Buckling of conical shells", University College London, PhD Thesis, 1987.
[32] J. Tani, "Buckling of truncated conical shells under combined pressure and heating", Journal of Thermal Stresses, 7(3-4), 1984, 307-316.
[33] J. Tani, "Buckling of truncated conical shells under combined axial load, pressure and heating", Journal of Applied Mechanics, Transactions of the ASME, 52(2), 1985, 402-408.
[34] M. Esslinger, R. Van Impe, "Theoretical buckling loads of conical shells", in Proceedings of ECCS Colloquium on Stability of Plates and Shell Structures, Ghent University, 1987, pp. 387-395.
[35] L. Lackman, J. Penzien, "Buckling of circular cones under axial compression", Journal of Applied Mechanics, Transaction of ASME, 27(3), 1961, 458-460.
[36] V. I. Weingarten, E. J. Morgan, P. Seide, "Elastic stability of thin-walled cylindrical and conical shells under axial compression", AIAA Journal, 3(3), 1965, 500-505.
[37] V. I. Weingarten, E. J. Morgan, P. Seide, "Elastic stability of thin-walled cylindrical and conical shells under combined internal pressure and axial compression", AIAA Journal, 3(6), 1965, 1118-1125.
[38] J. Arbocz, "Buckling of conical shells under axial compression", NASA CR-1162, 1968, pp. 1-52.
[39] C. G. Foster, "Axial compression buckling of conical and cylindrical shells", Experimental Mechanics, 27(3), 1987, 255-261.
[40] H. El-Sobky, A. A. Singace, "An experiment on elastically compressed frusta", Thin-Walled Structures, 33(4), 1999, 231-244.
[41] H. Ramsey, "Plastic buckling of conical shells under axial compression", International Journal of Mechanical Sciences, 19(5), 1977, 257-272.
[42] A. G. Mamalis, W. Johnson, "The quasi-static crumpling of thin-walled circular cylinders and frusta under axial compression", International Journal of Mechanical Sciences, 25(9-10), 1983, 713-732.
[43] A. G. Mamalis, W. Johnson, G. L. Viegelahn, "The crumpling of steel thin-walled tubes and frusta under axial compression at elevated strain-rates: Some experimental results", International Journal of Mechanical Sciences, 26(11-12), 1984, 537-547.
[44] A. G. Mamalis, D. E. Manolakos, G. L. Viegelahn, N. M. Vaxevanidis, W. Johnson, "On the inextensional axial collapse of thin PVC conical shells", International Journal of Mechanical Sciences, 28(5), 1986, 323-335.
[45] N. K. Gupta, G. L. Easwara Prasda, S. K. Gupta, "Plastic collapse of metallic conical frusta of large semi-apical angles", International Journal of Crashworthiness, 2(4), 1997, 349 366.
[46] G. L. Easwara Prasda, N. K Gupta, "An experimental study of deformation modes ofdomes and large-angled frusta at different rates of compression", International Journal of Impact Engineering, 32(1-4), 2005, 400-415.
[47] N. K. Gupta, M. N. Sheriff, R. Velmurugan, "A study on buckling of thin conical frusta under axial loads", Thin-Walled Structures, 44(9), 2006, 986-996.
[48] M. K. Chryssanthopoulos, C. Poggi, "Collapse strength of unstiffened conical shells under axial compression", Journal of Constructional Steel Research, 57(2), 2001, 165-184.
[49] J. Blachut, O. Ifayefunmi, M. Corfa, "Collapse and Buckling of Conical Shells", Proceedings of the International Offshore (Ocean) and Polar Engineering Conference, ISOPE-2011 TPC-296, 2011, pp. 887-893, Cupertino, California, USA (ISBN 978-1-880653 96-8).
[50] J. Blachut, O. Ifayefunmi, "Plastic buckling of conical shells", Journal of Offshore Mechanics and Arctic Engineering, Transaction of the ASME, 132(4), 2010, 041401-1 – 041401-11.
[51] T. Weller, J. Singer, "Further experimental studies on buckling of ring stiffened conical shells under axial compression", TAE 70, 1967, pp. 1-32.
[52] J. Singer, "The influence of stiffener geometry and spacing on the buckling of axially compressed cylindrical and conical shells", in Theory of Thin Shells, IUTAM 2nd Symposium Copenhagen, F. I. Niordson, (ed.), Springer-Verlag, Berlin, 1967, pp. 234-263.
[53] T. Weller, J. Singer, "Experimental studies on buckling of ring-stiffened conical shells under axial compression", Experimental Mechanics, 10(11), 1970, 449-457.
[54] A. Spagnoli, "Buckling of conical shells", Imperial College, London, PhD Thesis, 1997.
[55] W. D. Jordan, "Buckling of thin conical shells under uniform external pressure", in Bureau of Engineering Research, College of Engineering, University of Alabama, Alabama, ASTIA AD-55384. 1955.
[56] F. J. Shroeder, E. T. Kusterer, R. A. Hirsch, "An experimental determination of the stability of conical shells", Aircraft Armaments, Inc., Cockeyesville, Md., Report ER-1361, 1958.
[57] J. Singer, A. Eckstein, "Experimental investigations of the instability of conical shells under external pressure", Bull. Res. Counc. of Israel, 11C, 1962, pp. 97-122.
[58] J. Singer, D. Ben-David, "Experimental investigation of buckling of electroformed conical shells under hydrostatic pressure", AIAA Journal, 6(12), 1968, 2332-2338.
[59] R. L. Sendelbeck, J. Singer, "Further experimental studies of buckling of electroformed conical shells", AIAA Journal, 8(8), 1970, 1532-1534. [60] B. S. Golzan, H. Showkati, "Buckling of thin-walled conical shells under uniform external pressure", Thin-Walled Structures, 46(5), 2008, 516-529.
[61] C. T. F. Ross, D. Sawkins, T. Johns, "Inelastic buckling of thick-walled circular conical shells under external hydrostatic pressure", Ocean Engineering, 26(12), 1999, 1297-1310.
[62] J. R. MacKay, F. van Keulen, "A review of external pressure testing techniques for shells including a novel volume-control method", Experimental Mechanics, 50(6), 2010, 753 772.

[63] M. A. Krenzke, "Hydrostatic test of conical reducers between cylinder with or without stiffeners at the cone-cylinder junctures", David Taylor Model Basin, Report 1187, 1959, pp. 1-21.
[64] R. V. Raetz, "An experimental investigation of the strength of small-scale conical reducer sections between cylindrical shells under external hydrostatic pressure", David Taylor Model Basin, Report 1397, 1960, pp. 1-27.
[65] J. Singer, "Buckling of orthotropic and stiffened conical shells", NASA TN D-1510, 1962, pp. 463-475.
[66] J. K. Anderson, R. C. Davis, "Buckling tests of two 4.6 meter-diameter, magnesium ring-stiffened conical shells loaded under external pressure", NASA TN-D-7303, 1973, pp. 1-69.
[67] J. G. Williams, R. C. Davis, "Buckling experiments on stiffened cast-epoxy conical shells", Experimental Mechanics, 15(9), 1975, 329-338.
[68] C. T. F. Ross, T. Johns, "Buckling and vibration of ring-stiffened cones under uniform external pressure", Thin-Walled Structures, 6(4), 1988, 321-342.
[69] C. T. F. Ross, "Plastic collapse of thin-walled ring-stiffened conical shells under uniform external pressure", Journal of Ship Research, 39(2), 1995, 166-175.
[70] C. T. F. Ross, T. Johns, "Plastic axisymmetric collapse of thin-walled circular cylinders and cones under uniform external pressure", Thin-Walled Structures, 30(1-4), 1998, 35-54.
[71] C. T. F. Ross, D. Sawkins, J. Thomas, A. P. F. Little, "Plastic collapse of circular conical shells under uniform external pressure", Advances in Engineering Software, 30(9-11), 1999, 631-647.
[72] C. T. F. Ross, A. P. F. Little, K. A. Adeniyi, "Plastic buckling of ring-stiffened conical shells under external hydrostatic pressure", Ocean Engineering, 32(1), 2005, 21-36.
[73] C. T. F. Ross, A. P. F. Little, "Design charts for the general instability of ring stiffened conical shells under external hydrostatic pressure", Thin-Walled Structures, 45(2), 2007, 199 - 208.
[74] C. T. F. Ross, A. P. F. Little, R. Allsop, C. Smith, M. Engelhard, "Plastic general instability of ring-reinforced conical shells under uniform external pressure", Marine Technology, 44(4), 2007, 268-277.
[75] C. T. F. Ross, "A proposed design chart to predict the inelastic buckling of conical shells under uniform external pressure", Marine Technology, 44(2), 2007, 77-81.
[76] C. T. F. Ross, G. Andriosopoulos, A . P. F. Little, "Plastic general instability of ring-stiffened conical shells under external pressure", Applied Mechanics and Materials, 13-14, 2008, 213-223.
[77] M. E. Barkey, M. C. Turgeon, T. Varun Nare, "Buckling of stiffened thin-walled truncated cones subjected to external pressure.", Experimental Mechanics, 48(3), 2008, 281-291.
[78] V. I. Weingarten, "Stability of internally pressurized conical shells under torsion", AIAA Journal, 2(10), 1964, 1782-1788.
[79] J. Singer, A. Eckstein, "Recent experimental studies of buckling of conical shells under torsion and external pressure", in Proceedings of the fifth Israel Conference on Aviation and Astronautics, Jerusalem Academic Press, 1963, pp. 135-146.
[80] A. Berkovits, J. Singer, "Buckling of unstiffened conical shells under combined torsion and axial compression or tension", Israel Journal of Technology, 3(1), 1965, 15-24.
[81] P. B. MacCalden, R. B. Matthiesen, "Combination torsion and axial compression tests of conical shells", A1AA Journal, 5(2), 1967, 305-309.
[82] V. I. Weingarten, P. Seide, "Elastic stability of thin-walled cylindrical and conical shells under combined external pressure and axial compression", AIAA Journal, 3(5), 1965, 913-920.
[83] M. R. S. C. Bose, G. Thomas, R. Palaninatham, S. P. Damodaran, P. Chellapandi, "Buckling investigations on a nuclear reactor inner vessel model.", Experimental Mechanics, 41(2), 2001, 144-150.
[84] A. Berkovits, J. Singer, T. Weller, "Buckling of unstiffened conical shells under combined loading", Experimental Mechanics, 7(11), 1967, 458-467.
[85] J. Blachut, O. Ifayefunmi, "Buckling of unstiffened steel cones subjected to axial compression and external pressure", Journal of Offshore Mechanics and Arctic Engineering, Transaction of the ASME, 134(3), 2012, 031603-1.- 031603-9.
[86] O. Ifayefunmi, J. Blachut. Combined stability of unstiffened cones – Theory, experiments and design codes. International Journal of Pressure Vessels and Piping 2012, 93 94, 57 - 68.
[87] O. Ifayefunmi. Combined stability of conical shells. PhD Thesis, University of Liverpool, Liverpool, 2011.
[88] J. Blachut. Interactive plastic buckling of cones subjected to axial compression and external pressure. Ocean Engineering 2012, 48, 10 - 16.
[89] D. Vandepitte, J. Rathe, B. Verhegghe, R. Paridaens, C. Verschaeve, "Experimental investigation of buckling of hydrostatically loaded, conical shells and practical evaluation of buckling loads", in Buckling of Shells, E. Ramm (ed.), Springer-Verlag, Berlin, 1982, pp. 375–399.
[90] D. Vandepitte, A. Van den Steen, R. Van Impe, G. Lagae, J. Rathé, "Elastic and elastic-plastic buckling of liquid-filled conical shells", in Buckling of Structures, Theory and Experiment, Josef Singer Anniversary Volume, Elsevier Science Publishers, Amsterdam, 1988, pp. 433–449.
[91] D. Vandepitte, G. Lagae, "Theoretical and experimental investigation of buckling of liquid-filled conical shells", in Third International Colloquium on Stability of Metal Structures, Paris, Preliminary Report, November 1983, pp. 399–406.
[92] R. Paridaens, D. Vandepitte, G. Lagae, J. Rathé, A. Van den Steen, "Design equations accounting for elastic buckling of liquid-filled conical shells", in Stability of Plates and Shell Structures, P. Dubas, D. Vandepitte (eds), Ghent University, 1987, pp. 425–430.
[93] J. Singer, "On the buckling of unstiffened orthotropic and stiffened conical shells", 7th Congress of International Aeronautique, 14-16 June, 1965, pp. 1-22.
[94] J. Singer, A. Berkovits, T. Weller, O. Ishai, M. Baruch, O. Harari, "Experimental and theoretical studies on buckling of conical and cylindrical shells under combined loading", TAE Report 48, 1966, pp. 69-84.
[95] L. Tong, "Buckling load of composite conical shells under axial compression", Journal of Applied Mechanics, 61(3), 1994, 718-719.
[96] A. H. Sofiyev, E. Schnack, "The buckling of cross-ply laminated non-homogenous orthotropic composite conical thin shell under a dynamic external pressure", ACTA Mechanica, 162(1-4), 2003, 29-40.
[97] A. H. Sofiyev, "The buckling of an orthotropic composite truncated conical shell with continuously varying thickness subject to a time dependent external pressure", Composite Part B: Engineering, 34(3), 2003, 227-233.
[98] A. H. Sofiyev, "The buckling of FGM truncated conical shells subjected to combined axial tension and hydrostatic pressure", Composite Structures, 92(2), 2010, 488-498.
[99] J. Zielnica, "Non-linear stability of elastic-plastic conical shell under combined load", Journal of Theoretical and Applied Mechanics, 41(3), 2003, 693-709.
[100].C. W. Bert, W. C. Crisman, G. M. Nordby, "Fabrication and full-scale structural evaluation of glass-fabric reinforced plastic shells", Journal of Aircraft, 5(1), 1968, 27-34.
[101] C. W. Bert, W. C. Crisman, G. M. Nordby, "Buckling of cylindrical and conical sandwish shells with orthotropic facings", AIAA Journal, 7(2), 1969, 250-257.
[102] L. Tong, "Buckling of filament-wound laminated conical shells under axial compression", AIAA Journals, 37(6), 1999, 778-781.
[103] E. Mahdi, A. M. Hamouda, B. B. Sahari, Y. A. Khalid, "Crushing behavior of cone-cylinder-cone composite system", Mechanics of Advanced Materials and Structures, 9(2), 2002, 99-117.
[104] N. J. Hoff, "Thin conical shells under arbitrary loads", Journal of Applied Mechanics, Transactions of the ASME, 77(4), 1955, 557-562.
[105] P. Seide, "A Donnell-Type theory for asymmetrical bending and buckling of thin conical shells", Journal of Applied Mechanics, 24(4), 1957, 547-552.
[106] S. B. Batdorf, "A simplified method of elastic-stability analysis for thin cylindrical shells: I – Donnell's equation", NACA TN 1341, 1947, pp. 1-37.
[107] M. Esslinger, J. Ciprian, "Buckling of thin conical shells under axial loads with or without internal pressure", in Buckling of Shells, Proceedings of the state-of-the-Art Colloquium, E. Ramm, (ed.), Springer, Berlin, 1982, pp. 355-374.
[108] API RP 2A, "Recommended practice for planning, designing and constructing fixed offshore platforms", American Petroleum Institute, 19th Edition, 2003.

[109] DIN 18 800, "Structural steelwork: analysis of safety against buckling of shells", Deutsche Norm., 1990.
[110] ECCS TWG 8.4., "Buckling of steel shells", European design recommendations, 5th Edition, European Convention for Constructional Steelwork, 2008.
[111] DnV CN 30.1, "Buckling strength analysis", Det Norske Veritas, 1992.
[112] C. Poggi L. Finzi, "Approximation formulas for the design of conical shells under various loading conditions", in Proceedings of ECCS Colloquium on Stability of Plates and Shell Structures, Ghent University, 1987, pp. 397-404.
[113] H. Schmidt, R. Krysik, "Static strength of transition cones in tubular members under axial compression and internal pressure", in Tubular Structures VI, Proc. 6th Int. Symp. Tub. Structures, Melbourne, Dec. 1994, A. A. Balkema, (ed.), pp. 163-168.
[114] J. Blachut, "On elastic-plastic buckling of cones", Thin-Walled Structures, 49(1), 2011, 45-52.
[115] C. D. Babcock, "Shell stability", Journal of Applied Mechanics, Transactions of the ASME, 50(4b), 1983, 935-940.
[116]C. Doerich, J. M. Rotter, "Accurate determination of plastic collapse loads from finite element analyses", Journal of Pressure Vessel Technology, Transactions of the ASME, 133(1), 2011, 011202-1-011202-10.
[117] L. H. Donnell, C. C. Wan, "Effects of imperfections on buckling of thin cylinders and columns under axial compression", Journal of Applied Mechanics, 17(1), 1950, 73-83.
[118] C. D. Babcock, "Experiments in shell buckling", in Thin Shell Structures, Theory, Experiment, and Design, Y. C. Fung and E. E. Sechler, (eds), NJ, Prentice-Hall, Eaglewood Cliffs, 1974, pp. 345-369.
[119] J. Singer, "Buckling experiments on shell - A review of recent development", TAE Report No. 403, 1980, pp. 1-81.
[120] J. W. Hutchinson, W. T. Koiter, "Post buckling theory", Applied Mechanics Review, 23, 1970, 1353-1366.
[121] J. Arbocz, "Shell stability analysis: theory and practice", in Collapse: The Buckling of Structures in Theory and Practice, J. M. T. Thompson, G. W. Hunt, (eds), Cambridge University Press, 1983, pp. 43-74.
[122] J. Arbocz, "Past, present and future of shell stability analysis", Z. fuer Flug- wissenschaften und Weltraumforschung, 5(6), 1981, 335-348.
[123] D. Bushnell, "Computerized Buckling Analysis of Shells", Martinus Nihjoff Publishers, Dordrecht, 1985.
[124] J. Zielnica, "Imperfection sensitivity and stability of an elastic-plastic conical shell
under axisymmetrical load", Archive of Applied Mechanics, 72(6-7), 2002, 395-417.
[125] J. Singer, H. Abramovich, "The development of shell imperfection measurement techniques", Thin-Walled Structures, 23(1-4), 1995, 379-398.
[126] Y. Goldfeld, I. Sheinman, M. Baruch, "Imperfection sensitivity of conical shells", AIAA Journal, 41(3), 2003, 517 - 524.
[127] G. Q. Zhang, J. Arbocz, "Initial postbuckling analysis of anisotropic conical shells", in Proceedings of 34th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, USA, 19-22 April, 1993, pp. 326-335.
[128] G. Q. Zhang, "Stability analysis of anisotropic conical shells", PhD Dissertation, Delft University of Technology, 1993.
[129].M. K. Chryssanthopoulos, C. Poggi, A. Spagnoli, "Buckling design of conical shells based on validated numerical models", Thin-Walled Structures, 31(1-3), 1998, 257 - 270.
[130] M. Jabareen, I. Sheinman, "Postbuckling analysis of geometrically imperfect conical shells", ASCE Journal of Engineering Mechanics, 132(12), 2006, 1326 - 1334.
[131] M. Jabareen, I. Sheinman, "Stability of imperfect stiffened conical shells", International Journal of Solids and Structures, 46(10), 2009, 2111 - 2125.
[132]P. A. Cooper, C. B. Dexter, "Buckling of a conical shell with local imperfections", NASA TM X-2991, 1974, pp. 1-21.
[133]O. Ifayefunmi, J. Blachut, "The Effect of Shape, Boundary and Thickness Imperfections on Plastic Buckling of Cones", Proceedings of the International Conference on Ocean, Offshore and Arctic Engineering (OMAE 2011), Vol. 2, OMAE2011-49055, 2011, pp. 23-33, ASME, NY, USA (ISBN: 978-0-7918-4434-2).
[134] J. Singer, "The effect of axial constraint on the instability of thin conical shells under external pressure", Journal of Applied Mechanics, Transactions of the ASME, 29(1), 1962, 212 - 214.
[135] M. Baruch, O. Harari, J. Singer, "Effect of in-plane boundary conditions on the stability of conical shells under hydrostatic pressure", in Proceeding of the 9th Israel Annual Conference on Aviation and Astronautics, Israel Journal of Technology, 5(1), 1967, 12-24.
[136] G. A. Thurston, "Effect of boundary conditions on the buckling of conical shells under hydrostatic pressure", Journal of Applied Mechanics, Transactions of the ASME, 32(1), 1965, 208 - 209.
[137] J. Singer, "Buckling of clamped conical shells under external pressure", AIAA Journal, 4(2), 1966, 328-337. [138] N. Pariatmono, M. K. Chryssanthopoulos, "Asymmetric elastic buckling of axially compressed conical shells with various end conditions", AIAA Journal, 33(11), 1995, 2218 - 2227.
[139] A. Spagnoli, "Koiter circles in the buckling of axially compressed conical shells", International Journal of Solids and Structures, 40(22), 2003, 6095-6109.
[140] M. K. Chryssanthopoulos, A. Spagnoli, "The influence of radial edge constraint on the stability of stiffened conical shells in compression", Thin-Walled Structures, 27(2), 1997, 147 - 163.