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Numerical and experimental analysis of buckling and post buckling in cylindrical shells with circular cutout

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Abstract: Buckling in cylindrical shells has been a major issue for researchers for more than a century. Cylindrical shells are often used in the production of aircrafts, racks, boilers, pipelines, cars, and some submarine structures. These structures may experience axial compression loads in their longevity and yield to buckling. Furthermore, these structures usually have disruptions, such as cutouts, which may have adverse effects on their stability. In the present paper using finite element method, the buckling of cylinders with circular cutout of AA6061 aluminum alloy under loading are investigated. The effect of some geometric parameters such as cutout position and cutout size on the critical load of buckling of these shells was studied. According to the results, with increase in the diameter of cutout the critical load of buckling sharply decreases. The results of the numerical analysis were verified by a series of experimental tests.

Keywords: Buckling, Post-Buckling, Cutout, FEM Method, Aluminium Alloy