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# Buckling of cylindrical shells in rigid medium

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*The local buckling of metal liners is a crucial practical task when manufacturing and exploiting metal-composite pressure vessels. This paper considers deformation of a thin-walled cylindrical shell (liner) rigidly confined by cylindrical cage under external pressure loading. The primary focus is on accounting initial imperfections in terms of technological deviations: local notches and ridges on the liner and container, which, in their turn, have regular geometry. The present investigation is numerical and employs a three-dimensional model, where the liner and the container are simulated with volumetric finite elements. Besides, this model allows taking into account the girth welds in the liner. The study analyses the mechanical behavior of the liner according to the elastic and elastic-plastic patterns. We consider two types of loading of the liner: heating the liner in the cold cage and pressure moulding of the liner by the cooled container without any thermal contact. The numerical results have shown the essential dependence of the maximum critical pressure on the liner on the value of the technological deviations.*

**Keywords:** stability of cylindrical shells, shell structures, local buckling, local internal deformation, plastic pressure, initial design imperfections, metal-composite vessels, high-pressure vessels, variable liner thickness, critical load, finite element simulation

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