

## Some New Thoughts on the Buckling of Thin Cylindrical Shells

**Parthasarathi Mandal**

*Civil and Construction Engineering, UMIST, UK*

The classical theory of buckling of axially loaded thin cylindrical shells predicts that the buckling stress is directly proportional to the ratio of thickness to diameter ( $t/R$ ), other things being equal. But the empirical data show that the buckling stress is proportional to  $(t/R)^{1.5}$ , other things being equal. Also there is wide scatter in the buckling stress data. The “imperfection-sensitive”, “non-linear” behaviour is thought to be the cause of the above. Experiments on self-weight buckling of open-topped cylindrical shells agree well with the mean experimental data from the literature. The less scatter in the self-weight buckling data is attributed to the “statical determinacy” of the situation, which allows a post-buckling dimple to grow at a well-defined “plateau load”. Whereas the large scatter in tests on cylinders with closed ends (most of the literature data) may be attributed to the lack of static determinacy. The hypothesis has been verified by a non-linear finite-element analysis.

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