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Abstract

Local buckling generated by excessive bending and/or longitudinal compression is one of the main threats to pipeline integrity. The resistance to local buckling is usually measured by compressive strain capacity (CSC). Extensive work has been performed on the CSC of pipes through both experiments and numerical modeling. Many CSC models have been developed to compute the CSC.

The comparison of the existing CSC models often shows (1) large differences in recognized input parameters and their applicable ranges, (2) large differences in computed CSC, especially for pressurized conditions, (3) large differences in recommended safety factors; and (4) inconsistent trends on model conservatism.

Refined compressive strain models were developed recently. The development involves comprehensive review of existing CSC models, selecting modeling processes that represent field conditions, sensitivity studies on parameters affecting the CSC, and the model evaluation against experimental data.

In this paper, the refined compressive strain models and the key improvement to the modeling processes are summarized.

Keywords

Pipeline, Strain-based design, SBD, Compressive strain capacity, Compressive strain limit, Buckling, Wrinkle