

## **An overview on research of buckling of subsea pipe-in-pipe system**

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### **Summary**

This paper focuses on the methodologies on strength and buckling of typical submarine pipeline (Pipe-in-pipe system) under high temperature and high pressure (HT/HP) conditions. The internal high pressure and high temperature of oil/gas, external hydraulic pressure in deepwater, variational frictional force of soil, and the complex structure of the PIP system make the equilibrium equation of the subsea pipeline exhibit strong nonlinear performance in such nonlinear boundary conditions. The numerical methods are summarized for solving the nonlinear equations in this paper. The paper also presents evaluation methods for the lateral and upheaval buckling of two types of pipe-in-pipe systems (compliant and non-compliant) that are widely used in the offshore oil and gas industry.

The post-buckling mode is even more complex, and post-buckling stress and strain are much more difficult to obtain. Researches on post-buckling in both theory and experiment are overviewed in this paper. The advances on thermal stability and safety of compliant and non-compliant pipe-in-pipe systems are also presented which are going to have more application to both design and operation of subsea pipelines in deepwater engineering.

