

# THE STUDY OF LATERAL BUCKLING MITIGATION METHODS FOR SUBSEA PIPELINES

Mohammad Sagharichiha  
Iranian Offshore Engineering and Construction Company  
(IOEC)

[saghari@ioec.com](mailto:saghari@ioec.com)

## ABSTRACT

The present study introduces artificial buckling triggering features and then presents more description about snake pipe laying as the most common method for South Pars pipelines. Also the post buckling configuration and the strains resulting for single buckle and artificial buckles have been calculated with FEM program ANSYS. Limit states, as per DNV OS-F101 and SAFEBUCK Guideline are used for the verification of the buckling response.

## INTRODUCTION

Compressive loads are commonly induced in pipelines by the frictional restraint of axial extension due to high temperature and pressure. The pipeline section that is virtually anchored could buckle either vertically (upheaval buckling), or horizontally (lateral buckling), this is caused by axial force near the initial imperfection. A single isolated unacceptable buckle would result in significant lateral bending moment and strains. The release of the effective axial compression into the multi artificial buckles would result buckling development in a controlled way with feed-in sharing between the different buckles.

## EFFECTIVE AXIAL FORCE

If the expansion due to temperature and pressure is restrained in some way, for example by the frictional restraint of the seabed, then axial compressive force will develop in the pipeline, as illustrated in Figure 1.

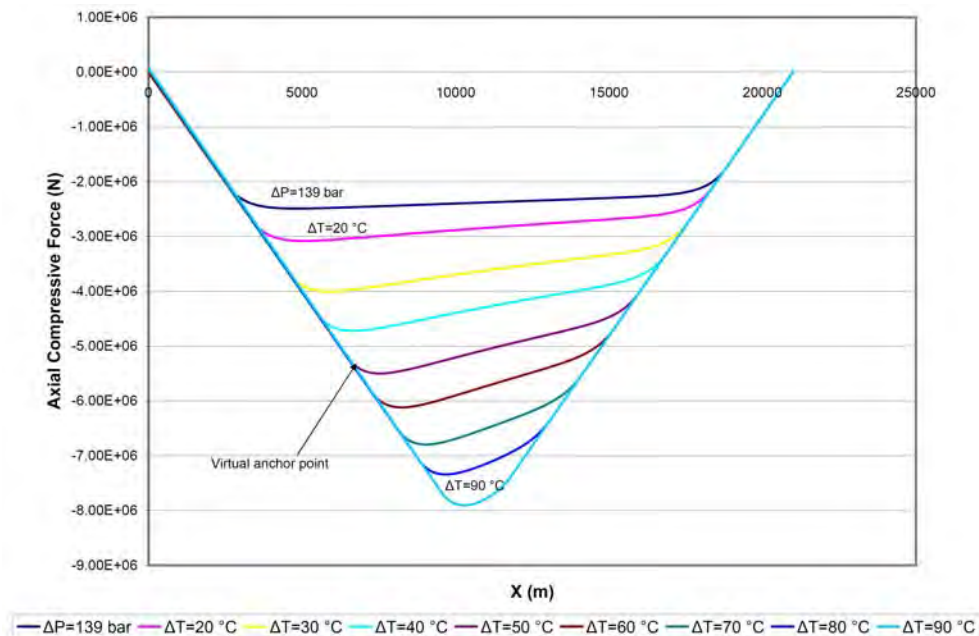


Figure 1: Axial compressive force along the straight pipeline in different conditions

Since pressure and temperature vary along the pipeline length, the fully constrained force also varies along the length as the pipe cools. This is shown in Figure 2 by the fall in the curve between  $x=0$  and  $x=L$ .