CERE
Center for Energy Resources Engineering

CERE – SEMINAR

Thursday 29 April 2021
09:00 to 10:00 a.m.
Online from link in calendar invitation

"Extending the reach of coiled tubing in horizontal wells using innovative methodologies"

By

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Abstract

Our project aims at extending the reach of the coiled tubing (CT) in horizontal bore wells with the use of injectable materials that can act as supporting structures to the CT. CT is a continuous steel or composite tubing, normally 1 "to 3.5'' in OD, that is injected into the horizontal well bore for logging, cleaning, perforation, pumping etc. [1,2]. CT intervention is indispensable for stimulation and maintenance of horizontal wellbores which usually extend > 33000 ft. Mechanical friction between CT and well casing leads to **buckling** and **eventual lock-up** of CT in the bore well [3]. The current solutions to reduce friction such as lubricants, vibratory tools, tractors and optimized taper designs can only facilitate a CT reach of up to ~18000 ft. [4]. Limitation of CT reach directly affects the well productivity.

Numerical investigations point out that by **reducing the clearance between CT and well casing (Figure 1) with support materials**, the buckling of CT can be diminished largely [5]. This hypothesis will be tested in the **pilot scale set up at DTU (Figure 2)** by injecting suitable materials into the annulus of the well casing and CT. The support materials should be injectable, should have the required mechanical properties and be non-toxic. A series of buckling tests are then performed on the CT enclosed inside well casing, by applying a fixed force ('Force in') on it using an electric cylinder (Figure 1) with different amounts of support material between the CT and well casing. The results prove that in the presence of support material, the mechanical stability of CT is higher and the buckling is lower, which is evident from the increase in 'Force out' values.

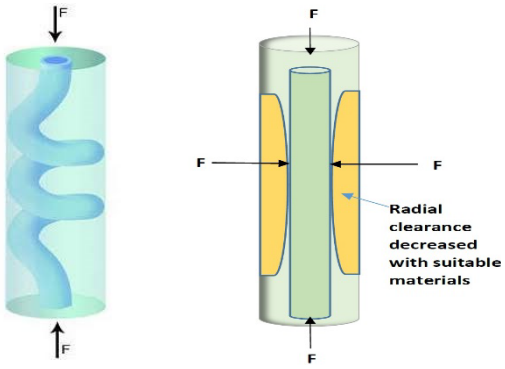

Figure 1: Schematic of CT buckling (left) and Support materials in the annulus preventing buckling of the tube (right)

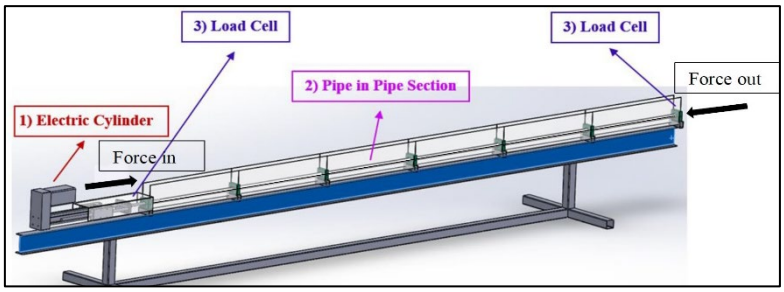

Figure 2: Schematic of 'Pilot scale set up' of well casing and CT equipped with Electric cylinder, load cell and 6m long 'pipe in pipe' section.

Acknowledgement:

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References:

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[4] S. Livescu and S. Craig, Journal of Petroleum Science and Engineering 157, 2017, pp.747–759.
[5] R.F. Mitchell, Society of petroleum engineers Drilling and Completion, 23(4), 2008, pp.361-370.