

Modelling of Flow in Annulus

Publieke samenvatting / Public summary

Aanleiding

For multiphase flow in pipes, many predictive models are available. In some specific cases however, multiphase flow takes place in the annular space of a tube-in-tube system, either concentric or excentric. For these systems, it is currently not well understood which factors govern the flow phenomena and what parameters are relevant to scale flow phenomena. An example of increasing importance of flow in the annulus of pipe-in-pipe systems is in gas wells, where end of production often is caused by liquid loading. This is the process where at lower pressure and lower flow rates, the produced (or condensed) liquids are no longer produced to surface but start accumulating downhole. This results in an additional pressure drop and thereby an even further reduction in the flow rate.

Doelstelling

A number of mitigation techniques are commonly used to address this issue, like the use of foamers, intermittent production, or the use of velocity strings. The latter technique makes use of a production tubing of reduced diameter to increase the gas velocity and therefore promote liquid transport. When installing such a velocity string, it also becomes possible to produce the fluids within the tubing-string annulus (rather than the core string). Although some industry sources (Oudeman, 2007) report gains in producing fluids (gas and condensate or gas and water) by such a method, there is currently no adequate model to predict these gains (especially the effects of a acentric position of the string in the tubing is unknown). The

Projectinformatie / Project information

Projectnummer / Project number

TKITOET2017-02-UG

Subsidiebedrag / Grant amount

€ 340.000,00

Algemene informatie / General information

Penvoerder / Secretariat

TNO

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goal of this project is to address this lack and provide first order models for two-phase flow in annuli, specifically the onset of liquid loading.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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