

CFD Modeling and Optimization Design of the FTS Reactor over Fe and Co based Catalyst on FPSO Environment

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Recently GTL-FPSO process, which converts natural gas into liquid products in the offshore, has received much attention as the conversion technology of stranded gas to clean fuels. To optimize GTL-FPSO process, the separation and control of inert gases such as CO₂, CH₄ and N₂ in the front of FTS reactor are important for the optimization of catalytic process including heat-carrier control, minimization of piping and compact design of reactor.

In this work, the effect of the heat-carrier control on the reaction of FTS over Fe and Co based catalyst system has been observed and experimental cases were compared. Also, a spatio-temporal model was developed to analyze the dynamic performance of a multi-tubular fixed-bed reactor, and the CFD simulation of the reactor interior was performed on a CFD tool such as COMSOL Multiphysics.

This research carries out the dynamic modeling and simulation of the MTFBR model to confirm of the internal changes from the start-up to the point reaching the steady-state. Furthermore, to prevent the hotspots, this research designs optimal cooling temperature for shell side inlet temperature.