Applying Computational Fluid Dynamics (CFD) Modeling to the Gas-to-Liquid (GTL) Process of Floating Production Systems

Mendoza Joseph Albert, 황성원†
인하대학교 화학공학과
(sungwon.hwang@inha.ac.kr†)

Gas-to-liquid (GTL) process on a floating production, storage, and offloading (FPSO) vessel has been an alternative option to the widely used onshore production of liquid hydrocarbon products because of the reduced costs in transporting the feed gas via a pipeline system from offshore plants. Computational simulation and models utilized in the design of chemical processes have been gaining worldwide attention. It is due to its cost-effective advantage in designing a major equipment such as a reactor before its fabrication. Different parameters such as reactor length, gas flow rate, inlet temperature, etc. are essential for the optimal design of reactors in the GTL processes. In this study, a multi-tubular reactor was designed for the GTL process of synthesizing methanol using computational fluid dynamics (CFD) modeling. The influence of various operating parameters on the conversion and temperature profiles inside the tubular reactor was investigated. Heat transfer effects with a flowing coolant was studied also. The results were validated with experimental reaction kinetics. Model calibration and optimization were performed to predict the maximum overall yield of the product.