Optimization of Common Fractionation Unit of Natural Gas Liquefaction Plant Using Model Predictive Control

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Because of limited fuel reserves, increasing prices of oil and growing concerns about the environment, natural gases (NG) are receiving attention as low-carbon, eco-friendly fuels. Natural gases have very large gas-to-liquid ratio, so the liquefaction process is essential to use NG as fuel. Natural gas liquefaction plant is composed of acid gas removal unit, drying unit, mercury removal unit, common fractionation unit, liquefaction unit, and storage. Common fractionation unit, part of the natural gas liquefaction plant, has 4 columns in series, so it shows high-level of nonlinearities. In this work, dynamic simulation model of common fractionation unit is developed using Aspen HYSYS. Then, model predictive control method is applied to optimize the process for several operation conditions.