

Feasibility Check Modeling for Natural Gas Liquefaction Process Optimization

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Multi-stream heat exchanger is a major equipment in LNG plant. In this unit, multiple hot streams (hot refrigerant, natural gas, and etc.) and cold streams (cold refrigerant) exchange heat simultaneously for liquefying natural gas. Because of its complexity, modeling of multi-stream heat exchanger is difficult. Thus, previous researches are adopted heat exchanger network (HEN) concept. The major assumption of HEN is constant heat capacity. Thus, feasibility check points are inlet and outlet temperature of each stream. However, phase of stream can be changed during heat exchange in multi-stream heat exchanger and it causes rapid change of heat capacity.

In this article, we use equation of state (EOS) for more accurate modeling. Because of non-constant heat capacity, all points not only inlet and outlet temperature of each stream must be checked for feasibility. The model is illustrated using simulations and optimizations of natural gas liquefaction processes as case studies.

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