Contribution ID: **665** Type: **Poster Presentation**

C3Po1E-07 [30]: Optimal design for cryogenic structured packing column using particle swarm optimization algorithm

Wednesday 24 July 2019 09:00 (2 hours)

Cryogenic air separation is by present the most economical approach to gain high-purity products in a large scale. Structured packing columns (SPC) are widely focused and applied due to their characteristics of high efficiency and energy saving in the cryogenic distillation process. The main aims of the design of SPC are to reduce energy consumption and initial investment, while its optimal design is a highly nonlinear and multivariable problem. The coexistence of real variables and integer variables, such as the flow rates and the positions of materials at the inlets/outlets, makes the optimization become a typical mixed integer nonlinear programming (MINLP) problem. The purpose of this paper is to study the optimal design for the cryogenic SPC using the particle swarm optimization (PSO) algorithm. With the basis of original research, a modified PSO for handling the MINLP problem (MI-PSO) is proposed. A multi-objective optimal design for the SPC in cryogenic air separation unit (ASU) with the capacity of 17000 Nm3/h is investigated. By MI-PSO algorithm, the total exergy loss reduces 36.3% and the main condenser heat load decreases 5.4% after optimization.

Authors: Mr WANG, Bin (Institute Refrigeration and Cryogenics, Zhejiang University); Ms SHI, Shanshan; Mr WANG, Shunhao; Prof. QIU, Limin

Co-author: Prof. ZHANG, Xiaobin

Presenter: Mr WANG, Bin (Institute Refrigeration and Cryogenics, Zhejiang University)

Session Classification: C3Po1E - Air and Carbon Dioxide Systems