عنوان مقاله:

Advanced Exergoeconomic Analysis of C۳MR, MFC and DMR Refrigeration Cycles in an Integrated Cryogenic Process

محل انتشار:

مجله پردازش گاز, دوره 6, شماره 1 (سال: 1397)

تعداد صفحات اصل مقاله: 31

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خلاصه مقاله:

C۳MR, MFC, and DMR processes in an integrated LNG-NGL-NRU structure are investigated using the conventional and advanced exergy and exergoeconomic analyses. The results of advanced exergy analysis reveal that in most of the equipment, the highest amount of irreversibility is occurred because of endogenous exergy destruction. In C۳MR process, compressor C۵ with ۹۷۳۰ kW; in MFC process, compressor C۱ with ۶۳۴۲ kW; and in DMR process, compressor C۳ with ۱۰۰۰۸ kW; have the most amount of avoidable endogenous exergy destruction in comparison with the other equipment. According to the advanced exergoeconomic analysis, the amount of endogenous part of exergy destruction cost and investment cost is higher than the exogenous part for most of the equipment, representing that interactions among the equipment is not considerable. Compressors have the highest amount of avoidable endogenous investment cost in all of the processes. Furthermore, in C۳MR process, HX۲ heat exchanger with ۱۱۲۱ /h; in MFC process, compressor C۱ with ۴۵۰ /h; and in DMR process, HX۳ heat exchanger with ۳۹۵۵ /h; have the most amount of avoidable endogenous exergy destruction cost. Based on total costs defined for the equipment, in C۳MR process, HX۲ heat exchanger with ۱۱۲۶ /h should be modified. In MFC process, compressor C۱ with ۵۰۴.۷ /h should be considered. In DMR process, HX۳ heat exchanger with ۳۹۶۳ /h should be improved its performance. Finally, sensitivity analysis as well as validation have been conducted, and three different strategies are used to reduce the cost of avoidable exergy destruction of system equipment.

کلمات کلیدی:

Advanced exergy analysis, Advanced exergoeconomic analysis, Exergy destruction cost, Cryogenic process