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Analysis of Possible Equipment in the Reduction Unit of a Low Tonnage Liquefied Natural Gas Production Plant

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Abstract : The demand for natural gas (NG) is increasing every year around the world, so it is necessary to produce and transport NG in large quantities. To solve this problem, liquefied natural gas (LNG) plants are used, using different equipment and different technologies to achieve the required LNG quality. To determine the best efficiency of the LNG liquefaction plant, it is necessary to analyze the equipment used in this process and identify other technological solutions for LNG production using more productive and energy-efficient equipment. Based on this, mathematical models of the technological process of the LNG plant were created, which are based on a two-circuit system of heat exchange equipment and a nitrogen isolated cycle for NG cooling. The final liquefaction of natural gas is performed on the construction of the basic principle of the Joule-Thompson effect. The pressure and temperature drop are considered on different types of equipment such as throttle valve, which was used in the basic scheme; turbo expander and supersonic separator, which act as new equipment, to be compared with the efficiency of the basic scheme of the unit. New configurations of LNG plants are suggested, which can be used in almost all LNG facilities. As a result of the analysis, it turned out that the turbo expander and the supersonic separator have comparatively equal potential in comparison with the baseline scheme execution on the throttle valve. A more rational method of selecting the technology and the equipment used for natural gas liquefaction can improve the efficiency of low-tonnage plants and reduce the cost of gas for own needs.

Keywords : gas liquefaction, gas, Joule-Thompson effect, LNG, low-tonnage LNG, supersonic separator, Throttle valve, turbo expander
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