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Investigation and improvement of ejector refrigeration system using computational fluid dynamics technique

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Abstract: Ejector refrigeration systems are usually designed to utilize low grade energy for driving the cycle. They also have low maintenance cost because they operate without a compressor. Mainly, the ejector performance directly affects the refrigerating performance. Therefore, an investigation on the characteristics and an efficient design of the ejector are important to improve ejector refrigeration systems. In this study, the computational fluid dynamics (CFD) code, FLUENT, is employed to predict the flow phenomena and performance of CPM and CMA steam ejectors.

The ejector refrigeration system, using water as the working fluid, is operated at 120-140 degrees C boiler temperature and 5-15 degrees C evaporator temperature. CFD can predict ejector performance very well and reveal the effect of operating conditions on an effective area that is directly related to its performance. Besides, it is found that the flow pattern does not depend much on the suction zone because the results of axisymmetric and 3D simulation are similar. This investigation aids the understanding of ejector characteristics and provides information for designing the ejector to suit the optimum condition. (c) 2007 Elsevier Ltd. All rights reserved.

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