

Feasibility study of evaporation pressure through the effects on the performance of high-temperature organic Rankine cycles

Muhammad Abdul Qyyum, 카딜 킨자¹, Junaid Haider, Amjad Riaz, 이문용[†]
영남대학교; ¹영남대
(mynlee@ynu.ac.kr[†])

We present a feasibility study of the evaporation pressure for high-temperature organic Rankine cycles (ORC) with a comprehensive assessment of the 2E's (energy and exergy), with the application of three working fluids, namely m-xylene from the aromatic family and propylcyclohexane and decane from the alkane family. To determine the optimal evaporation pressure, high-temperature ORCs are examined based on various performance parameters under increasing evaporation pressure. The 2E's analysis shows that the m-xylene-adopted ORC can produce 165.52 kW (with 20.08% exergy efficiency) turbine work output, which is 13.4% and 16.64% higher than propylcyclohexane and decane, respectively. The optimal evaporation pressure value is deduced from the comparative analysis of two efficiencies i.e. ORC and exergetic through statistical technique of normalization. This research was supported by the Basic Science Research Program Foundation of Korea (NRF) funded by the Ministry of Education (2018R1A2B6001566), the Priority Research Centers Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2014R1A6A1031189).