Efficiency optimization potential in supercritical Organic Rankine Cycles

Abstract:
Nowadays, the use of Organic Rankine Cycle (ORC) in decentralised applications is linked with the fact that this process allows the use of low temperature heat sources and offers an advantageous efficiency in small-scale concepts. Many state-of-the-art and innovative applications can successfully use the ORC process. In this process, according to the heat source level, special attention must be drawn to the choice of the appropriate working fluid, which is a factor that affects the thermal and exergetic efficiency of the cycle. The investigation of supercritical parameters of various working fluids in ORC applications seems to bring promising results concerning the efficiency of the application. This paper presents the results from a simulation of the ORC and the optimization potential of the process when using supercritical parameters. In order to optimize the process, various working fluids are considered and compared concerning their thermal efficiency and the usable percentage of heat. The reduction of exergy losses is discussed based on the need of surplus heat exchanger surface.