عنوان مقاله:

A steam Rankine cycle with two-stage pumping to enhance the waste heat recovery from internal combustion engines

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خلاصه مقاله:

In this research, a high-temperature Rankin cycle (HTRC) with two-stage pumping is presented and investigated. In this cycle, two different pressures and mass flow rates in the HTRC result in two advantages. First, the possibility of direct recovery from the engine block by working fluid of water, which is a low quality waste heat source, is created in a HTRC. Secondly, by doing this, the mean effective temperature of heat addition increases, and hence the efficiency of the Rankin cycle also improves. The proposed cycle was examined with the thermodynamic model. The results showed that in a HTRC with a two-stage pumping with an increase of ۸% in the mean effective temperature of heat addition, the cycle efficiency is slightly improved. Although the operational work obtained from the waste heat recovery from the engine cooling system was insignificant, the effect of the innovation on the recovery from the exhaust was significant. The innovation seems not economical for this low produced energy. However, it should be said that although the effect of the innovation on the increase of the recovery cycle efficiency is low, the changes that must be implemented in the system are also low.

کلمات کلیدی:

Waste heat recovery, Rankine cycle, Internal combustion engine cooling system, Two-stage pumping, Mean effective temperature of heat addition.