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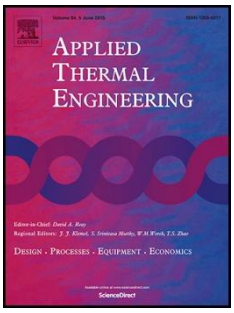

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Effect of mist cooling technique on exergy and energy analysis of steam injected gas turbine cycle

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Highlights

- Steam injected gas turbine cycle with Steam and steam/mist coolants was investigated.
- Coolant heat gain and blade surface temperature enhances at lower mist temperature.
- At mist fraction 2% exergy efficiency is decreased by 0.03% compared with steam only.
- Total exergy destruction rate decreases with saturated steam coolant temperature.
- Net work and plant efficiency increase at higher saturated steam coolant temperature.

Abstract

The common cogeneration applications is steam injected gas turbine. By using cogeneration, it can be obtained a greatest benefit from fuel energy. In steam injected gas turbine the heat of exhaust gases is used to produce the steam, this steam injects to combustion chamber. In the present work, the generated steam will be directed not only to combustion chamber, but also will be used to cool the blade turbine by using a closed loop. In this study, the effect of addition mist to steam as coolant fluid was investigated. The energy and exergy analyses for steam injected gas turbine cycle with a closed loop cooling technique by using steam and steam/mist were investigated. The investigation is made at varied values of steam coolant temperature,