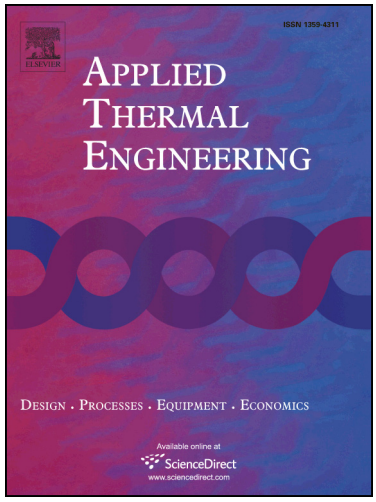

Research Paper

Thermo-Ecological Performance analyses and optimizations of irreversible gas cycle engines

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Thermo-Ecological Performance analyses and optimizations of irreversible gas cycle engines

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Abstract

This paper reports ecological performance analyses and optimization of irreversible gas cycle engines such as Joule-Brayton cycle (JB), Atkinson cycle (AC), Otto cycle (OC), Diesel cycle (DC), Miller cycle (MC), Dual-Atkinson cycle (DAC), Dual-Diesel cycle (DDC), Dual-Miller cycle (DMC) engines based on the ecological coefficient of performance (ECOP) criterion which covers internal irreversibility, heat leak and finite-rate of heat transfer. Comprehensive computational analyses have been conducted to investigate the global and optimal performances of the gas cycle engines. The results obtained based on the ECOP criterion are compared with a different ecological function which is named as the ecologic objective-function and with the maximum power output conditions. The results have been acquired introducing the compression ratio, cut-off ratio, pressure ratio, air recharging ratio, source temperature ratio and internal irreversibility parameter. The changes of cycle performances with respect to these parameters are examined and demonstrated with figures.

Key words*:* Gas cycle engines; Performance analysis; Optimization; Power output; Irreversibility; ECOP.

1. Introduction

So many analyses, studies and investigations have been carried to optimize the performance of the heat engine cycles by considering the environmental regulations and economical restrictions.

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