

Power Efficiency Characteristics of Magnetohydrodynamic Thermodynamic Gas Cycle

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Abstract : In this study, the performance of a thermodynamic gas cycle of magnetohydrodynamic (MHD) power generation is considered and presented in terms of power efficiency curves. The dissipation mechanisms considered include: fluid friction modeled by means of the isentropic efficiency of the compressor, heat transfer leakage directly from the hot reservoir to the cold heat reservoir, and constant velocity of the MHD generator. The study demonstrates that power and efficiency vanish at the extremes of both slow and fast operating conditions. These points are demonstrated on power efficiency curves and the locus of efficiency at maximum power and the locus of maximum efficiency. Qualitatively, the considered loss mechanisms have a similar effect on the efficiency at maximum power operation and on maximum efficiency operation, thus these efficiencies are reduced, even for small values of the loss mechanisms.

Keywords : magnetohydrodynamic generator, electrical efficiency, maximum power, maximum efficiency, heat engine

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