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# Design Parameters Optimization of a Gas Turbine with Exhaust Gas Recirculation: An Energy and Exergy Approach

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**Abstract :** The exhaust gas recirculation, EGR, implementation on gas turbines is increasingly gaining the attention of many researchers. This emerging technology presents many advantages, such as lowering the NOx emissions and facilitating post-combustion carbon capture as the carbon dioxide concentration in the cycle increases. As interesting as this technology may seem, the gas turbine, or its thermodynamic equivalent, the Brayton cycle, shows an intrinsic efficiency decrease with increasing EGR rate. In this paper, a thermodynamic model is presented to show the cycle efficiency decrease with EGR, alternative values of design parameters of both the pressure ratio (PR) and the turbine inlet temperature (TIT) are then proposed to optimize the cycle efficiency with different EGR rates. Results show that depending on the given EGR rate, both the design PR & TIT should be increased to compensate for the deficit in efficiency.

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