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The experimental investigation of gas-coupled free piston Stirling generators

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Space free piston Stirling generator technology is an important thermoelectric conversion technology in space reactor energy system. In order to realize the high reliability and low vibration characteristics of the space reactor energy system, the dual gas-coupled opposing Stirling generator is proposed in this paper, and its cooperative operation mechanism will also be investigated. Firstly, a numerical model of five degree of freedom dual gas-coupled opposing Stirling generator with coupling thermodynamics, dynamics, linear motor and vibration transmission is established. Then the model is used to analyze the adaptive process from start-up to stable operation of the dual gas-coupled opposing Stirling generator and the influence of the dual-gas connecting pipe and key parameters on the cooperative operation of Stirling generator. Finally, an experimental system for the cooperative operation of dual gas-coupled opposing Stirling generator is set up and experimental investigation is carried out. The results of experimental investigation and theoretical simulation are compared and analyzed, then the theoretical model is modified.

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