

عنوان مقاله:

An Investigation on the Effects of Gas Pressure Drop in Heat Exchangers on Dynamics of a Free Piston Stirling Engine

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خلاصه مقاله:

This paper is devoted to study the effects of pressure drop in heat exchangers on the dynamics of a free piston Stirling engine. First, the dynamic equations governing the pistons as well as the gas pressure equations for hot and cold spaces of the engine are extracted. Then, by substituting the obtained pressure equations into the dynamic relationships the final nonlinear dynamic equations governing the free piston Stirling engine are acquired. Next, effects of the gas pressure drop in heat exchangers on maximum strokes of the pistons and their velocities and accelerations are investigated. Furthermore, influences of pressure drop increase in the heat exchangers on maximum and minimum gas volume and pressure in both hot and cold spaces are evaluated. Finally, the trend of variations of work and power corresponding to the increase of pressure drop in the heat exchangers are studied. Based on the obtained results of this paper, the assumption of uniform pressure distribution in the engine cylinder (as used in the Schmidt theory) causes some errors in predicting the dynamic behavior of the free piston hot-air engines. Besides, the increase of pressure drop in the heat exchangers results in deteriorating the dynamic performance of the engine.

کلمات کلیدی:

,Free Piston Stirling Engine, Dynamics, Pressure Drop, Hot and Cold Spaces

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