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Investigation of a Stirling cryocooler driven by a moving magnet linear motor

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The attention is focused on the Stirling cryocooler driven by a moving magnet linear motor because of its advantages of high efficiency, small vibration, and long life. In order to find the parameters influencing the efficiency of the compact Stirling cryocooler, a linear motor structure was proposed and designed, the performance of the cooler is experimentally optimized. The relationship between diameter of the coil and the motor constant and the performance of the cooler was experimentally explored. The stiffness and assembly structure of the flexure bearings, the filling pressure and operating frequency were optimized by comparing the performance of the cryocooler. In the experiment, the maximum cooling power of the cryocooler is 2.3W@80K, with input power less than 50W. The investigation provides reference to the development of the compact and high-efficient Stirling cryocooler.

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