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STUDY AND MINIMIZATION OF VIBRATION INDUCED IN A MINIATURE INTEGRAL CRANK DRIVEN STIRLING CRYOCOOLER

Content :

When there is discussion about design of cryocooler then the main consideration about is self-induced vibration of an Infrared imaging system. The cryocoolers in these applications cause different type of forces and moments that interfere in the proper stabilization of the camera and leading to image blurring and loss of point accuracy. This phenomenon is known as "jitter". Here we are using stirling coolers operate using a two-axes crank mechanism with a 90-degree mechanical phase shift that is connected with a brushless DC motor. An already known source of vibration in crank driven cryocooler is the crank mechanism and the reciprocating components like compressor and expander pistons. An another source due to the motor torque output when it responds to the pressure wave loads in both cylinder. In this paper we will point out the vibration sources in rotary coolers and methods to reduce their magnitude. A SAGE simulation software is used to model the stirling cryocooler and to measure the different dynamic forces acting on the system.

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