SPACE POWER SYMPOSIUM (C3)
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THERMOACOUSTIC GENERATORS IN SPACE APPLICATIONS

Abstract

Thermoacoustic Generators (TAGs) are a class of heat engines that convert energy from a thermal reservoir into powerful acoustic oscillations which can then be converted to electrical power. Modern TAGs operating on a thermodynamic cycle which approximates the Stirling cycle can achieve very high conversion efficiencies, up to 40% or more. TAGs may employ any heat source and sink as their power source, however, in space applications these are normally limited to radioisotope thermal generators (RTGs) or concentrated solar thermal energy. In addition to their high efficiency, other advantageous of these engines include their lack of moving parts, which provides for high reliability and longevity, simple construction, as well as new designs which reduce or eliminate resulting vibrations, which have made these engines of particular interest to the space industry. NASA, ESA and other space players have started to express interest in TAGs as this technology is now reaching a mature level of development, however, the main obstacle hindering introduction to the space industry is the typically large mass of the resonating cavity containing the high pressure working gas of the TAG, since until now development focus has been on Earth based applications where mass reductions are less critical. Current efforts at Active Space Technologies to improve the specific power (W/kg) of these engines and develop designs to be used in space applications to make this technology not only viable but also competitive, will be presented.