



Researcher: Shahryar Zare

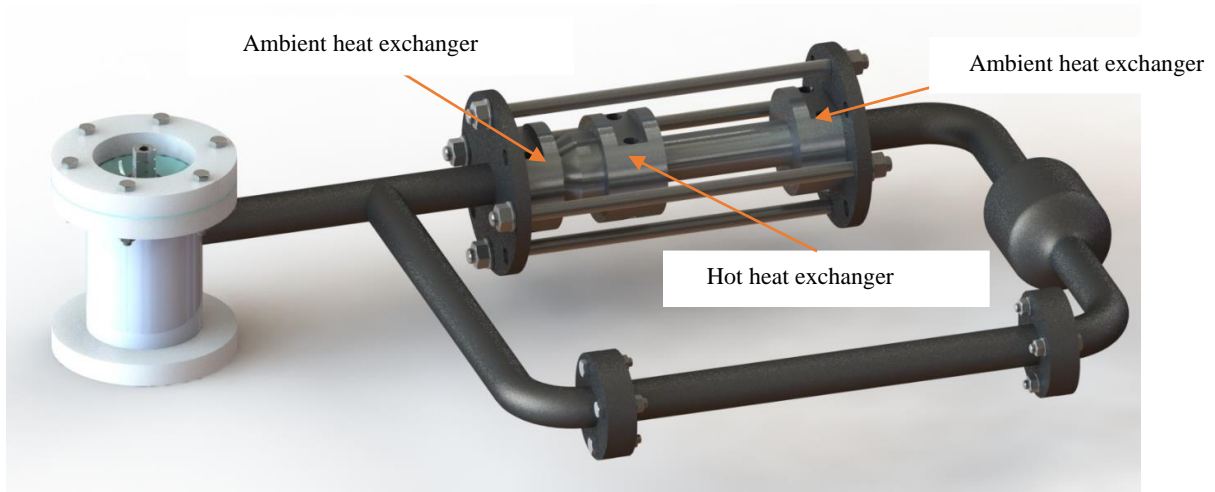
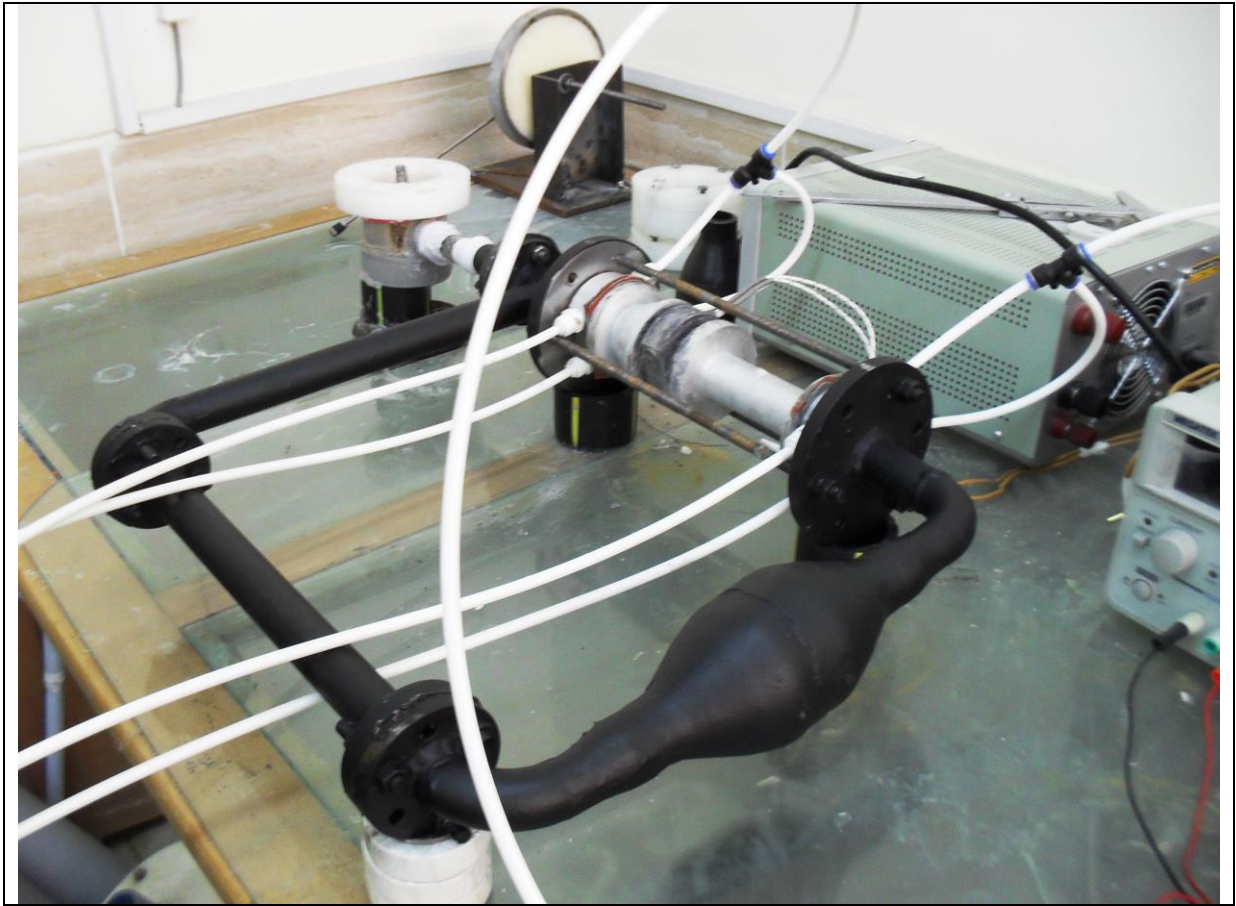
Research work title: Thermoacoustic oscillator based on Stirling cycle

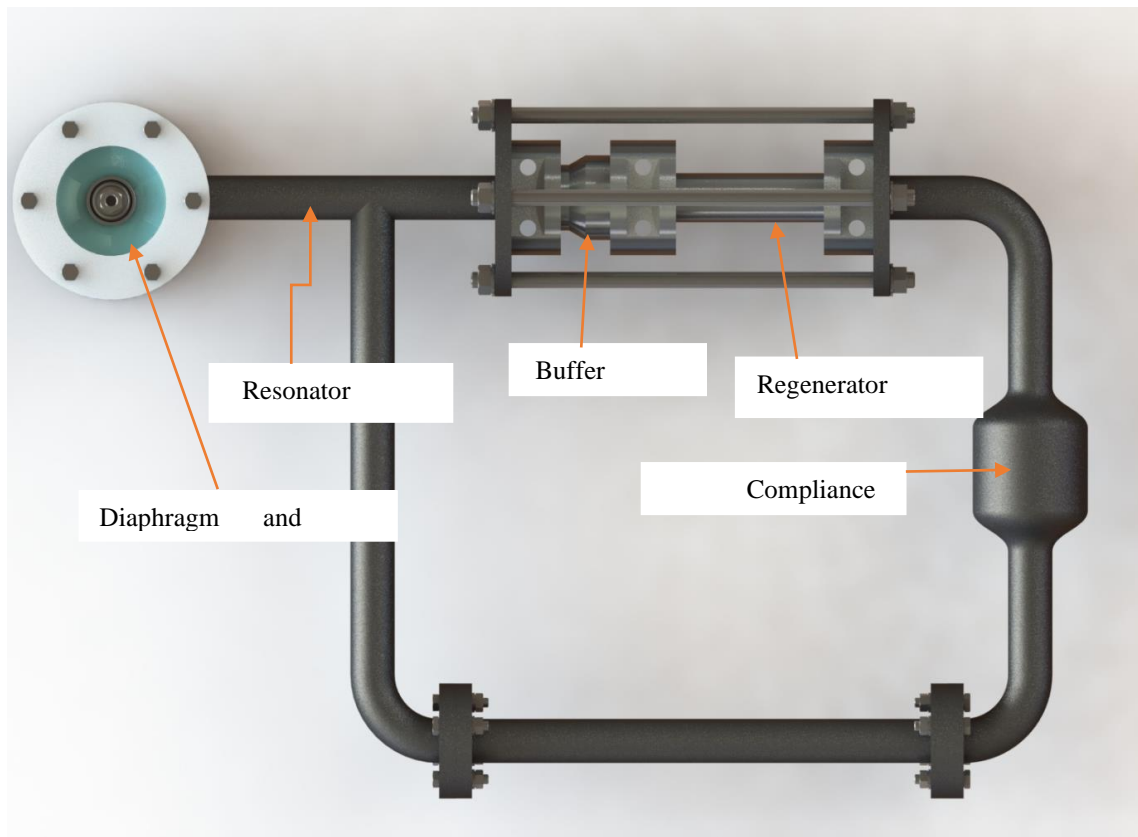
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Executive organization: Shiraz University of Technology

Abstract

In this work, for the first time, a Stirling cycle has been generated using acoustics and particles within a closed loop, and then a thermoacoustic Stirling engine has been designed and constructed. To put it better, in this work, unlike the old version of the Stirling engines (where the thermodynamic cycle is formed using power and displacers pistons), the Stirling cycle is created using acoustics and pressure oscillations of particles within a closed loop. This ultimately results in a reciprocating motion that generates electricity. In simpler terms, with hot and cold sources in a closed loop, it is possible to produce traveling waves that form a Stirling cycle. indeed, two air particles in the loop will oscillate with a phase difference close to 90 degrees, precisely like the behavior of pistons in traditional Stirling engines. Using this approach, in this engine, for the first time, all mechanical links, pistons, and moving parts have been eliminated, leading to a reduction in the cost of engine production. Another advantage of this engine is its high operating frequency compared to other Stirling engines. Being self-starting and not requiring essential maintenance (due to the absence of mechanical links and moving parts in the engine structure) are other advantages of this engine. This oscillator can work with any type of fuel, such as solar energy, nuclear fuel, etc. On the other hand, the removal of moving parts in the engine has made its nominal efficiency not drop during its working life (unlike solar panels). Another advantage of this type of engine is related to high power production (on an industrial scale) in a small area.





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