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Optimization of a small-scale thermoacoustic cooler

Based on the linear thermoacoustic theory, the influence of geometric parameters of regenerator and phase mechanical (PM) tube on thermoacoustic refrigerator's cooling capacity is studied in this paper. Theoretical analysis results show that there exists an optimal phase and impedance values to make the cooling capacity maximum. On this basis, the experimental study of the relationship between the geometric parameters of regenerator and PM tube and thermoacoustic refrigerator's cooling capacity is also carried out. The experimental results are consistent with the theoretical analysis results, which notably showing the reliability of analytical results. This will provides an effective guidance for the design and optimization of thermoacoustic refrigerator.

Primary author: Ms LI, Juan (Technical Institute of Physics and Chemistry, CAS)

Co-authors: Prof. LI, Qing (Technical Institute of Physics and Chemistry, CAS); Dr ZHOU, gang (Technical Institute of Physics and Chemistry, CAS)

Presenter: Dr ZHOU, gang (Technical Institute of Physics and Chemistry, CAS)

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