Abstract Submitted
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Micro-Scale Thermoacoustics[1] AVSHALOM OFFNER, GUY Z. RAMON, TECHNION — Thermoacoustic phenomena conversion of heat to acoustic oscillations - may be harnessed for construction of reliable, practically maintenance-free engines and heat pumps. Specifically, miniaturization of thermoacoustic devices holds great promise for cooling of micro-electronic components. However, as devices size is pushed down to micro-meter scale it is expected that non-negligible slip effects will exist at the solid-fluid interface. Accordingly, new theoretical models for thermoacoustic engines and heat pumps were derived, accounting for a slip boundary condition. These models are essential for the design process of micro-scale thermoacoustic devices that will operate under ultrasonic frequencies. Stability curves for engines - representing the onset of self-sustained oscillations - were calculated with both no-slip and slip boundary conditions, revealing improvement in the performance of engines with slip at the resonance frequency range applicable for micro-scale devices. Maximum achievable temperature differences curves for thermoacoustic heat pumps were calculated, revealing the negative effect of slip on the ability to pump heat up a temperature gradient.

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Avshalom Offner
TECHNION

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