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3D Thermoacoustics in a Microwave Plasma[1] SETH PREE, JOHN P KOULAKIS, SETH PUTTERMAN, University of California Los Angeles — Pulsed microwaves directed at an acoustic cavity filled with partially ionized gas may generate intense sound fields. These fields have been shown to center and confine the hottest portions of the gas to the center of a spherical cavity via a generalization of acoustic radiation pressure we have called the pycnoclinic acoustic force. Because partially ionized gas is luminous, the sound field is rendered visible by luminosity and temperature oscillations caused by the acoustic field's periodic adiabatic compression. This observation indicates that the microwave absorptivity of the gas may also fluctuate as sound passes through it. If microwave absorption increases in phase with the acoustic compression, the conditions for acoustic amplification may be met. This would allow the generation of high amplitude sound and possibly confinement with a continuous wave microwave source. We will describe the apparatus, present evidence of acoustic plasma confinement, and outline the theoretical conditions for microwave plasma thermoacoustics. We will also discuss how sustaining such a high amplitude sound field and the pycnoclinic acoustic force with this 3D thermoacoustic effect may enable a new laboratory model of convection in a central force.

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