# Abstracts

## Theoretical Analysis of Acoustic Signal Generation in Materials Irradiated with Microwave Energy

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Stress gradients generated by thermal expansion, electrostriction, and radiation pressure are sources of elastic waves in microwave irradiated materials. A theoretical analysis taking into account induced volume and surface forces due to these interaction mechanisms is presented. Complete solutions of the dynamical equations for the one-dimensional special case are given for different boundary conditions. The closed-form solutions were found to consist of both a stationary part, whose effect is important only in the immediate region of the incident electromagnetic wave, and a traveling part which propagates through the elastic material. Expressions for the Fourier transforms of these solutions are also given. To quantify these results, pressure and displacement waveforms in microwave irradiated physiological saline were computed. Thermal expansion was considerably more effective than either electrostriction or radiation pressure in converting electromagnetic energy to acoustic energy.

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