Abstract Submitted
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Theory of self-oscillation and mode locking in a longitudinal photoacoustic resonator[1] ZIYAO TANG, Brown University, HAN JUNG PARK, University of Tennessee at Chattanooga, ROGER DIEBOLD, Harvard University, GERALD J. DIEBOLD, Brown University — The wave equation for pressure that governs generation of the photoacoustic effect possesses a forcing term proportional to the time derivative of the energy delivered to the gas per unit volume and time. A positive pressure fluctuation, with its accompanying density increase, thus increases the optical absorption and provides a positive feedback mechanism for sound generation. A theory for self-oscillation in a one-dimensional resonator is given. Expressions for the photoacoustic pressure are derived for the cases of highly and weakly absorbing gases that indicate mode-locked sound generation. Experiments with CO2 lasers are reported where evidence of the self-generation effect was sought.

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