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Title:Physical mechanism for detecting a terahertz wave from acoustic emission enhancement in a gas plasma
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Abstract:A physical mechanism is described for detection of a terahertz wave from acoustic emission enhancement in a gas plasma. First the air is ionized by an 800nm laser pulse, and collision processes are neglected during this pulse time. When the pulse is gone, electron-molecule and electron-ion collisions begin to be considered, and the energy transferred to the molecules and ions leads to the temperature rising, thus an acoustic pressure can be achieved. If irradiating the gas plasma with a terahertz wave after the 800nm laser pulse, the translation motion of electrons and molecules can be enhanced, thus heating the plasma to a higher temperature and achieving a larger acoustic pressure. The enhanced acoustic pressure δp(t) whether or not with a terahertz wave has a dependence on the terahertz amplitude. Theoretical analysis shows that the terahertz field modulus can be obtained by |E<inf>THZ</inf>(t) α|dδp(t)/dt|. © 2012 Copyright Taylor and Francis Group, LLC.
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