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Title:Detection of modulated terahertz radiation using combined plasma and mechanical resonances in double-carbon-nanotube device

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Abstract:We propose a resonant detector of terahertz radiation modulated by megahertz or gigahertz signals. The detector is based on mechanically floating carbon nanotubes (CNTs), suspended over an insulator. The device operation is associated with the excitation of both plasma and mechanical oscillations in CNTs resulting in an ac displacement current between them. This current plays the role of the detector output signal. Using the proposed device model, we find that the frequency dependence of the detector responsivity exhibits a sharp peak at the combined plasma-mechanical resonance and estimate its maximum value.

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