

P2.3001 Forced nonlinear vertical oscillations of a single dust particle trapped in a standing striation

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The nonlinear features of the oscillatory motion of a single dust particle trapped in a standing striation are investigated. The method of the discharge current modulation [1, 2] is used to excite the nonlinear oscillations with the large amplitude of the order of 1.5 mm. The multi-resonance curves are obtained under the different shapes of modulating signal. The parametric instabilities, which were previously observed under the conditions of rf discharge in [3, 4, 5], are investigated in dc plasma. The detailed measurements of the amplitude-frequency characteristic near resonances at the fundamental and doubled frequencies make it possible to detect the vibrational hysteresis. The theory of the anharmonic oscillator provides a good quantitative description of the experimental data. The values of the thresholds of excitation of parametric instabilities, the anharmonic coefficients and the critical values of the oscillation amplitude for the hysteresis are calculated. The potential well, in which the microparticle oscillates, is calculated using the values of anharmonic coefficients. The vertical electric field in the vicinity of the dust particle equilibrium position is reconstructed.

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References

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