Title:	Revisiting nonlinear optical trapping of a single nanoparticle using generalized Lorentz-Mie theory.
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Abstract:	The elusive role of femtosecond pulsed excitation in enhancing the efficiency of optical trapping of nanoparticles over continuous-wave excitation is revisited. Using generalized Lorentz-Mie theory, optical trapping force on nanoparticles composed of materials having a wide range of linear refractive indices, including metamaterials having negative refractive indices, is investigated. It is shown how the incorporation of optical nonlinearity, fine-tuned by the laser parameters (for example, average power, pulse width, etc.), leads to the emergence of novel phenomena such as trap splitting facilitating trapping of multiple particles that were not captured in a previous study on nanoparticles with varying refractive indices using dipole approximation. Intriguingly, we show that the trap becomes highly stable due to negative optical scattering force, known as "Fano resonance." Furthermore, we observe the disappearance and reappearance of trapping wells with increasing refractive index under both continuous-wave and pulsed excitations. These findings show promising applications in the field of photonics through nanoscale optical manipulation controlled by optical nonlinearity.
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