Title:	Theoretical estimation of nonlinear optical force on dielectric spherical particles of arbitrary size under femtosecond pulsed excitation
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Keywords:	high-repetition-rate nanoparticles nonlinear optical force
Issue Date:	2017
Publisher:	APS
Citation:	Physical Review A, 96 (2)
Abstract:	Experimental evidence indicates that high-repetition-rate ultrafast pulsed excitation is more efficient in optical trapping of dielectric nanoparticles as compared with continuous-wave excitation at the same average power. The physics behind the different nature of force under these two excitation conditions remained deceptive until quite recently when it was theoretically explained, in the dipole limit, as a combined effect of (1) repetitive instantaneous momentum transfer and (2) optical Kerr nonlinearity. The role of optical Kerr effect was theoretically studied for larger dielectric spherical particles, in the ray optics limit, also. However, a theoretical underpinning is yet to be established as to whether the effect of optical nonlinearity is omnipresent across different particle sizes, which we investigate here. Using localized approximation of generalized Lorenz-Mie theory, we theoretically analyze the nature of force (and potential) and provide a detailed comparative discussion between this generalized scattering formulation with dipole scattering formulation for dielectric nanoparticles.
URI:	https://journals.aps.org/pra/abstract/10.1103/PhysRevA.96.023856 (https://journals.aps.org/pra/abstract/10.1103/PhysRevA.96.023856) http://hdl.handle.net/123456789/1851 (http://hdl.handle.net/123456789/1851)
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