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Study of plasmonic and magnetic modes in non-symmetric gold nano-ring geometries[1] LAROUSSE KHOSRAVI KHORASHAD, Department of Physics and Astronomy, Ohio University, 45701, HUI ZHANG, Departments of Physics and Astronomy, Rice University, 77005, EVA-MARIA ROLLER, TIM LIEDL, Ludwig-Maximilians-Universitat, 80539 Munich, Germany, ALEXANDER O. GOVOROV, Department of Physics and Astronomy, Ohio University, 45701 —
Research on the science of plasmonics and the study of the optical properties of photonic devices at the nanoscale have become essential over the past few decades owing to the introduction of innovative plasmonic devices and their vast applicability. The quest for light manipulation in metallic nanostructures has grown greatly due to the creation of novel optical devices for applications ranging from meta-materials and cloaking to optical sensing and plasmonic waveguides. Here, we present theoretical and numerical studies of complex nano-ring geometries composed of gold nano-spheres. We used the finite element method (COMSOL) for computational implementations. For each of the experimentally built structures, we have obtained the plasmonic resonance modes. The nano-ring structures exhibit magnetic, dipole and multipole plasmonic modes and these modes depend on the size of nanoparticles and the geometry of nano-rings. We also indicate that the plasmonic resonances observed in scattering and absorption spectra are highly dependent on symmetry breaking of nano-rings. Finally, we compare our results with the experiment and observe that our simulation is in good agreement with the experimental measurements.

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