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Calculating the scalar self-force for generic orbits in the Kerr spacetime[1] ZACHARY NASIPAK, University of North Carolina - Chapel Hill, THOMAS OSBURN, Oxford College of Emory University, CHARLES EVANS, University of North Carolina - Chapel Hill — We investigate the generic, bound motion of a scalar-charged point mass in the background spacetime of a more massive Kerr black hole. In the context of black hole perturbation theory, the evolution of these (E/IMRI) systems is quantified by a self-force term. As a developmental model, we consider the scalar self-force problem, where—like the gravitational case—the scalar field perturbation interacts back on the source charge and drives the smaller charged-bodys motion. We calculate the scalar self-force for several inclined, eccentric orbits, with inclinations ranging from $\iota = 0$ to $\iota = \pi$ and eccentricities ranging from $e = 0$ to $e = 0.8$. We use a frequency domain code written in Mathematica, along with a combination of spectral integration and MST function expansion techniques, to make calculations with arbitrary numerical precision. We also investigate various resonant orbital configurations for inclined, eccentric motion and observe previously reported quasinormal mode excitations in the self-force for highly-eccentric orbits around a highly-spinning black hole.

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