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Calculating the scalar self-force experienced by extreme-mass-ratio binaries during $r\theta$-resonances[1] ZACHARY NASIPAK, CHARLES R. EVANS, Univ of NC - Chapel Hill — A vast majority of extreme-mass-ratio black hole binaries (EMRIs) will encounter at least one strong $r\theta$-resonance as they evolve through LISA's passband. These resonances occur when the frequencies of the librating radial and polar motion of the EMRI's smaller body form a low-integer ratio, and they drive significant 'kicks' in the amount of energy and angular momentum that EMRIs radiate through gravitational waves. These kicks, if not properly accounted for, can amplify errors in modeled EMRI waveforms by factors of ~ 100. Despite the importance of modeling these resonant dynamics, researchers have not yet calculated the gravitational self-force experienced by EMRIs during $r\theta$-resonances. As a first step in quantifying these effects, we calculate the scalar self-force (the scalar analog to the gravitational self-force) experienced by a scalar-charged particle following an $r\theta$-resonant geodesic around a Kerr black hole. We present how local and global radiation-reaction effects vary with respect to initial conditions. We also demonstrate, numerically, that conservative self-force effects do not contribute to the leading-order evolution of the system, as hypothesized by previous researchers.

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