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Hybrid self-force approach for calculating long term inspirals of highly eccentric EMRIs THOMAS OSBURN, Univ of NC - Chapel Hill, NIELS WARBURTON, Massachusetts Institute of Technology, CHARLES EVANS, Univ of NC - Chapel Hill, SETH HOPPER, University College Dublin — Astrophysical models predict EMRIs to have eccentricities peaked around $e \sim 0.7$ and as high as $e \sim 0.8$. Such high eccentricities are a challenge to compute even with state-of-the-art frequency-domain-based self-force codes. Prospects of future eLISA observations dictate striving for cumulative theoretical phase errors less than $\delta\Phi \sim 10^{-2}$. This requires the orbit-averaged force to have fractional errors less than $\sim 10^{-8}$ and the oscillatory part of the self-force to have errors less than $\sim 10^{-3}$. In recent years a Lorenz gauge self-force code has been used to calculate long term inspirals of Schwarzschild EMRIs with $e \simeq 0.2$. We have developed a hybrid Lorenz gauge/Regge-Wheeler gauge self-force code that is capable of satisfying the error criterion even for astrophysically relevant high eccentricities. We describe the method and show progress in applying the approach to long term inspiral calculations of high eccentricity binaries.

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