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Identifying Contributing Harmonics in the Gravitational Wave Spectrum of Highly Eccentric EMRIs. ANDREW KAISER, Department of Physics, University of Arkansas, JORDAN STONE, Department of Physics, University of Colorado at Boulder, SLOAN AHRENS, Ahrens Software, Fayetteville, Arkansas, DANIEL KENNEFICK, Department of Physics, University of Arkansas — In the study of gravitational waves emitted from extreme mass ratio inspirals highly eccentric orbits are problematic because of the large number of harmonics, and thus the lengthy computation times that were thought to be inherent to it. The issue however, is made simpler because the spectrum is not that broad and is fairly localized. The true complexity lies in finding the peaks of the largest contributors to accurately describe the complete spectrum, since for any given multipole of the spectrum the position of the peak in the emission is difficult to predict. This project uses two methods of finding the peak harmonic of a given spectrum. The first method uses a skipping algorithm to systematically jump over harmonics with insignificant contributions to the total waveform. Because this method is still not completely efficient, a second method uses a Newtonian order approximation given by Peters and Matthews to give an estimate of the frequency of the actual waveform peak, and then fills in around this harmonics to give the spectrum. The two methods are complementary since the skipping algorithm can be used when the Newtonian estimation fails to find the peak immediately.

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