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Surrogate Model for Gravitational Wave Signals From Large-mass-ratio Black Hole Binaries With Aligned Spin[1] NUR RIFAT, GAURAV KHANNA, University of Rhode Island, SCOTT FIELD, UMass Dartmouth — Gravitational wave signals from compact astrophysical sources such as those observed by LIGO and Virgo require a high-accuracy waveform model for the analysis of the recorded signal. Current inspiral-merger-ringdown (IMR) models are calibrated only up to moderate mass ratios, thereby limiting their applicability to signals from high-mass ratio binary systems. In recent work, we described a reduced-order surrogate model for gravitational waveforms including several harmonic modes and with mass-ratios up to 10,000. This surrogate model was trained on waveform data generated by point-particle black hole perturbation theory. In this talk, we present extensions of this model to include spin on the primary black hole up to 0.8. To handle the increased dimensionality of the parameter space and hard-to-model features in the ringdown signal we have pursued methodological improvements including Gaussian process regression fits, a parametric domain decomposition strategy, and modifications to the reduced-order modeling step. We find that the resulting surrogate model is nearly as accurate as the underlying training data. We also discuss comparisons to numerical relativity in the comparable mass ratio limit.

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