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Surrogate models for numerical relativity waveforms CHAD GALLEY, JONATHAN BLACKMAN, California Institute of Technology, SCOTT FIELD, University of Maryland, MARK SCHEEL, BELA SZILAGYI, California Institute of Technology, MANUEL TIGLIO, University of Maryland — Simulating binary black hole coalescences involves solving Einstein's equations with large-scale computing resources that can take months to complete for a single numerical solution. This engenders a computationally intractable problem for multiple-query applications related to parameter space exploration, data analysis for gravitational wave detectors like LIGO, and semi-analytical waveform fits. Recently, reduced order modeling techniques were used to build surrogate models that substitute having to solve the original ordinary/partial differential equations which generate the waveform itself. Whereas the original waveform computation can carry large evaluation costs, the surrogate can be evaluated very quickly and often without loss of accuracy. I discuss a surrogate model for numerical relativity waveforms of non-spinning binary black hole coalescences. This surrogate can be used to generate numerical relativity waveforms with about 15 cycles for mass ratios in the range of 1 to 10 in the matter of milli-seconds as opposed to months compared to the Spectral Einstein Code. The results of this work represent a significant advance in using numerical relativity waveforms for multiple-query applications.

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