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A sparse representation of gravitational waves from precessing compact binaries JONATHAN BLACKMAN, BELA SZILAGYI, CHAD GALLEY, Cal Inst of Tech (Caltech), MANUEL TIGLIO, Cal Inst of Tech (Caltech), University of Maryland — With the advanced generation of gravitational wave detectors coming online in the near future, there is a need for accurate models of gravitational waveforms emitted by binary neutron stars and/or black holes. Post-Newtonian approximations work well for the early inspiral and there are models covering the late inspiral as well as merger and ringdown for the non-precessing case. While numerical relativity simulations have no difficulty with precession and can now provide accurate waveforms for a broad range of parameters, covering the 7 dimensional precessing parameter space with $\sim 10^7$ simulations is not feasible. There is still hope, as reduced order modelling techniques have been highly successful in reducing the impact of the curse of dimensionality for lower dimensional cases. We construct a reduced basis of Post-Newtonian waveforms for the full parameter space with mass ratios up to 10 and spins up to 0.9, and find that for the last 100 orbits only ~ 50 waveforms are needed. The huge compression relies heavily on a reparametrization which seeks to reduce the non-linearity of the waveforms. We also show that the addition of merger and ringdown only mildly increases the size of the basis.

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