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Remnant of binary black-hole mergers: New simulations, peak luminosity and hangup studies CARLOS LOUSTO, JAMES HEALY, Rochester Institute of Technology — We present the results of 61 new simulations of nonprecessing spinning black hole binaries with mass ratios $q = m_1/m_2$ in the range $1 \leq q \leq 1/3$ and individual spins covering the parameter space $-1 < \alpha_{1,2} < 1$. We additionally perform 10 new simulations of nonspinning black hole binaries with mass ratios covering the range $1/10 < q < 1$. We follow the evolution for typically the last ten orbits before to merger down to the formation of the final remnant black hole. This allows to assess the accuracy of our previous empirical formulae for relating the binary parameters to the remnant final black hole mass, spin and recoil. We find excellent agreement (typical errors $\sim 0.1\%$) for the mass and spin, and $\sim 5\%$ for the recoil. We use these new simulation to improve the fit to the above remnant formulae and add a formula for the peak luminosity of gravitational waves, typically produced around the merger of the two horizons into one. These formulae have direct application of to parameter estimation techniques applied to LIGO observation of gravitational waves from binary black hole mergers. We finally perform an study of the hangup effect for unequal mass binaries leading us to identify the spin variable that controls the number of orbits before merger as S_0^L.

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