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Measuring the redshift factor in binary black hole simulations AARON ZIMMERMAN, ADAM LEWIS, HARALD PFEIFFER, Canadian Institute for Theoretical Astrophysics — The redshift factor z is an invariant quantity of fundamental interest in Post-Newtonian and self-force descriptions of circular binaries. It allows for interconnections between each theory, and plays a central role in the Laws of Binary Black Hole Mechanics, which link local quantities to asymptotic measures of energy and angular momentum in these systems. Through these laws, the redshift factor is conjectured to have a close relation to the surface gravity of the event horizons of black holes in circular orbits. We have implemented a novel method for extracting the redshift factor on apparent horizons in numerical simulations of quasicircular binary inspirals. Our results confirm the conjectured relationship between z and the surface gravity of the holes. This redshift factor allows us to test PN and self-force predictions for z in spacetimes where the binary is only approximately circular, and allows for an array of new comparisons between analytic approximations and numerical simulations. I will present our new method, our initial results in using z to verify the Laws of Binary Black Holes Mechanics, and discuss future directions for this work.

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