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SENR, A Super-Efficient Code for Gravitational Wave Source Modeling: Latest Results IAN RUCHLIN, ZACHARIAH ETIENNE, West Virginia University, THOMAS BAUMGARTE, Bowdoin College — The science we extract from gravitational wave observations will be limited by our theoretical understanding, so with the recent breakthroughs by LIGO, reliable gravitational wave source modeling has never been more critical. Due to efficiency considerations, current numerical relativity codes are very limited in their applicability to direct LIGO source modeling, so it is important to develop new strategies for making our codes more efficient. We introduce SENR, a Super-Efficient, open-development numerical relativity (NR) code aimed at improving the efficiency of moving-puncture-based LIGO gravitational wave source modeling by 100x. SENR builds upon recent work, in which the BSSN equations are evolved in static spherical coordinates, to allow dynamical coordinates with arbitrary spatial distributions. The physical domain is mapped to a uniform-resolution grid on which derivative operations are approximated using standard central finite difference stencils. The source code is designed to be human-readable, efficient, parallelized, and readily extensible. We present the latest results from the SENR code.

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