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Multi-block systems in numerical relativity ERIK SCHNETTER, PETER DIENER, Louisiana State University, NILS DORBAND, Albert-Einstein-Institut, ENRIQUE PAZOS, MANUEL TIGLIO, Louisiana State University — Multi-block (or multi-patch) systems are computational methods to discretise manifolds by covering them with several independent blocks. Each block is then discretised in a conventional way, e.g.using finite differences. Thus multi-block systems are a natural approach in general relativity, where they correspond to using several maps to cover a domain. Multi-block systems have several major advantages: They can be used to avoid coordinate singularities, to use coordinates that are adapted to a particular problem, and to place numerical resolution where desired. In particular, they can be used to model spherical boundaries in a smooth manner and to track gravitational radiation efficiently in the wave zone of compact sources. While adaptive mesh refinement is essential to achieve a necessary accuracy *locally*, multi-block methods are superior in adapting a discretisation *globally* to a given problem setup. We report on recent results of fully relativistic three-dimensional time-dependent black hole simulations using multi-block systems. We will compare accuracy and efficiency to mesh refinement methods, demonstrating certain advantages of multi-block discretisations.

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