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Special Guest Lectures

Superconvergent Finite Element Solutions to Einstein's Constraint Equations on Multi-block Triangulations

Oleg Korobkin, Louisiana State University

Johnston Hall 338
June 17, 2008 - 10:30 am

Abstract:
I will present an approach for solving Einstein's constraint equations on three-dimensional multi-block domains using finite element methods. The solution, obtained using quadratic Lagrange elements on semi-structured simplicial meshes, appears superconvergent at most mesh vertices, by local symmetry of the finite element basis with respect to local spatial inversions. As proof of concept that this method is feasible for generating multi-block initial data in three dimensions, the Brill wave is constructed and evolved in time using a high order finite-differencing multi-block approach. Accurate and convergent gravitational wave signal is extracted from the numerical solution.

Speaker's Bio:
Oleg Korobkin is a graduate student in the Department of Physics and Astronomy at LSU. He received his Master's in Applied Physics and Mathematics from Moscow Institute of Physics and Technology, Russia. His research is focused on numerical methods for relativistic astrophysics, in particular, applications of finite element methods to initial data equations in numerical relativity.