

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Combined Space and Time Adaptivity Using the WAMR/G-Scheme Method ZACHARY ZIKOSKI, SAMUEL PAOLUCCI, University of Notre Dame, MAURO VALORANI, University of Rome “La Sapienza” — Adaptive methods in CFD allow for savings in execution time by reducing the number of unknowns solved for at each computational step. The Wavelet Adaptive Multiresolution Representation (WAMR) provides spatial adaptivity which automatically supplies grid resolution based on the local demands of the solution itself. Likewise, the G-Scheme framework applies a similar capability in time. A system of ODEs can be ordered and separated into subsets of “fast” or near-equilibrium modes, “slow” or frozen modes, and “active” intermediate modes. Only the active modes are integrated, with asymptotics accounting for the contributions of the slow and fast dynamics. The pairing of spatial adaptivity using the WAMR method and temporal adaptivity using the G-Scheme allows for a substantial reduction in space-time degrees of freedom needed. The combined WAMR/G-scheme method is applied to several problems including reactive, compressible flow simulations.

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Date submitted: 07 Aug 2009

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