1048-65-220 **Thomas Hagstrom*** (thagstrom@smu.edu), Department of Mathematics, PO Box 750156, Dallas, TX 75275-0156. *Local Time Stepping for Spectral Element Methods.*

Spectral element methods, as implemented, for example, in a discontinuous Galerkin framework, can provide accurate solutions of wave propagation problems in complex geometry using a small number of degrees-of-freedom per wavelength. However, the associated time-stepping problem is artificially stiff due to the need to differentiate polynomials throughout their domain of definition. Directly, the norm of the derivative matrix scales like P^2/H where P is the polynomial degree and H is a measure of the element size. Locally refined elements, associated with larger values of P or smaller values of H and required to resolve local features, then lead to further time step restrictions. We discuss various strategies for circumventing these issues including:

Integral evolution formulas;

Deferred correction of flux contributions from neighboring cells;

Dual grid filters, including novel Hermite-based discretizations which circumvent the quadratic P-dependence of the discrete differentiation operator.

(Received February 09, 2009)