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**Jay M Appleton\*** (appletj@clarkson.edu), 8 Clarkson Ave. Box 5815, Potsdam, NY 13699,  
and **Brian T Helenbrook** (bhelenbr@clarkson.edu). *A Lower-Triangular Mass Matrix  
Approach to Explicit Time Advancement for Continuous Triangular Finite Element Methods.*

When using explicit time advancement with continuous high order finite elements for unsteady partial differential equations, a mass matrix is formed which must be inverted to advance the solution in time. For the Gauss-Lobatto-Lagrange basis typically used on quadrilaterals, an accurate approximate diagonal mass matrix exists which makes explicit time stepping methods efficient while achieving  $p^{th}$ -order spatial convergence rates. No such approach exists for the triangles. This work introduces a lower triangular mass matrix for triangles that achieves  $p^{th}$ -order convergence. This lower-triangular method allows for computationally efficient time advancement without sacrificing spatial accuracy. (Received September 25, 2018)