1126-76-14 **Giacomo Capodaglio*** (giacomo.capodaglio@ttu.edu), Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX 79409, and **Eugenio Aulisa** (eugenio.aulisa@ttu.edu), Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX 79409. *A parallel particle tracking algorithm for finite element applications.*

Numerical simulations of a parallel particle tracking algorithm on unstructured finite element grids are presented. The algorithm is designed to work for both 2D and 3D applications and with linear and quadratic spatial discretization. In order to determine the position of the particle with respect to the mesh, a new inclusion test algorithm has been designed to work with parallel computing and finite element applications. Unlike existing works in the literature, we do not perform the advection of the given particle on the local domain, therefore the inversion of the isoparametric finite element mapping is requested. We comply with this demand implicitly using Newton-Raphson's iteration for all Lagrangian finite elements and all degrees of freedom. We conclude with tests that illustrate the performance of our algorithm and an application where the velocity field is obtained from the numerical solution of the Navier-Stokes equation. (Received October 25, 2016)