1154-65-1076 **Paul A Kuberry*** (pakuber@sandia.gov), Mailstop 1320, P.O. Box 5800, Albuquerque, NM 87125, and **Pavel B Bochev**, **Nathaniel A Trask** and **Mauro Perego**. *Generalized Moving Least-Squares approximation of variational problems for advection-diffusion problems.*

In most finite element methods, the mesh is used to both represent the domain and to define the finite element basis. As a result, the quality of such methods is tied to the quality of the mesh and may suffer when the latter deteriorates.

We present an approach by extending the Generalized Moving Least-Squares (GMLS) regression technique to approximation of bilinear forms, which separates the discretization of the PDE from the discretization of the domain. We make use of mesh quantities only for the integration of the GMLS polynomial basis. Our approach yields a non-conforming discretization of the weak equations that can be handled by standard discontinuous Galerkin or interior penalty terms.

Analysis of the approach will be presented along with numerical results demonstrating convergence and stability in the context of advection-diffusion. (Received September 13, 2019)