

In this talk, we present a framework for generation and warping of high-order triangular and tetrahedral meshes based on optimal weighted combinations of nodal positions. Methods within our framework consist of three steps. First, a set of optimal weights relating each node to its neighbors in the initial high-order mesh is calculated. Second, a user-defined boundary deformation is applied. Third, the final positions of the interior nodes are computed by solving a linear system based on the optimal weights and the boundary deformation. We present two *a priori* methods for generation of high-order curvilinear, tetrahedral meshes within our framework [1, 2] and their extension to warping such meshes. In particular, the methods compute affine and convex combinations of nodal positions, respectively. We present several numerical examples which demonstrate the capabilities of methods within our framework.

#### References:

- [1] M. Stees and S.M. Shontz, A high-order log barrier-based mesh generation and warping method, in Proc. of the 26th International Meshing Roundtable, vol. 203, Procedia Engineering, 2017, pp. 180-192.
- [2] M. Stees and S.M. Shontz, High-order mesh generation based on optimal affine combinations of nodal positions, Spectral and High Order Methods for Partial Differential Equations, Proceedings of ICOSAHOM 2018, Lecture Notes in Computational Science and Engineering, Springer, vol. 134, p. 229-238, August 2020.