

**Non-linear Moving Least Squares method and applications****Authors:**

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**Abstract:** The approximation of noisy data is a long-standing challenge in various fields, including computer-aided geometric design, solving partial differential equations numerically, and designing curves and surfaces. Existing methods work well for continuous data, and moving least squares, a popular technique in statistics and applied mathematics, is a successful example. However, these methods can suffer from unwanted effects like the Gibbs phenomenon when discontinuities are present in the data.

This talk proposes a novel approach that combines moving least squares with the well-established WENO (Weighted Essentially Non-Oscillatory) scheme. This hybrid method aims to create a non-linear operator that delivers improved approximations near discontinuities while maintaining accuracy in smooth regions. We will explore its properties in multiple dimensions and validate the theoretical findings through numerical experiments