Colloquium

Laboratory of Mathematical Modeling, Graduate School of Engineering Science, Osaka University, J706

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High Order Mesh Generation for Isogeometric Analysis

During high order simulations, the subparametric discretization used for geometry's representation (usually piecewise-linear) may lead to errors dominating errors related to the variable field discretization. For instance, solving the conservative form of the Euler equations generate a spurious entropy that spoil the solution. We look at an isogeometric analysis approach to solve this problem: in such methods, we use the same basis functions to represent the variables field and to discretize the geometry, what ensure the same order of errors for the geometric approximation and the variables discretization. Widely used in CAO, NURBS (Non Uniform Rational B-Spline) basis functions allow an exact representation of complicated geometries that we can meet in fluid mechanic and form an ideal family of basis functions for isogeometric analysis. In this talk, we will first define the NURBS curves and surfaces that we use for isogeometric analysis. Then, we will explain how to generate unstructured NURBS meshes and how to use mesh adaptation with NURBS meshes to reduce approximation error. At least, to illustrate the work, we will show some isogeometric numerical results for compressible fluid dynamics and we will compare them with the results provided by the same scheme on a piecewise-linear mesh.