Multimesh Finite Element Simulation of Flow and Computation of View With Applications in Computational Architecture

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Abstract

We present multimesh methods for finite element simulations of flow and computation of view for geometries described as collections of overlapping, non-matching meshes, with each mesh describing a separate object embedded into a common fixed background mesh. The computation of flow is based on a cut finite element method for the Stokes equations [1], and the computation of view is based on a new proposed measure of the view from a given location within the geometry described by the overlapping meshes. We consider the application to the design of settlement layouts, where the challenge is to position a number of objects (houses) in a background mesh (a landscape), so as to achieve good wind conditions and views for all houses in the settlement.

References

1. A. Johansson and M. G. Larson and A. Logg. High Order Cut Finite Element Methods for the Stokes Problem. Advanced Modeling and Simulation in Engineering Sciences (2213-7467). Vol. 2 (2015), p. artikel nr 24..