VARIATIONAL ADAPTIVE GRID GENERATION METHODS

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Variational methods of adaptive grid generation are considered. Functionals, depending on two metrics are involved. One metric is used for adaptation to the numerical solution of hosted equations, the other is used for grid orthogonalization and condensation near the boundary.

Functionals, depending on orthogonal invariants are considered. Harmonic mappings are also described by such functionals. The brief review of the modern theory of harmonic diffeomorphisms is presented.

Conformal invariants are also considered. The functional which is invariant under conformal transformations in the n - dimensional space is introduced. The hypothesis on existence of equations describing all homeomorphic mappings of a cube onto an arbitrary homeomorphic domain is formulated. The numerical algorithm for 2D adaptive grid generation with grid orthogonalization and condensation near the boundary is described.

Examples of computations for wind circulation in sea bays and reservoirs illustrate the method capabilities. Comparison with experimental data confirm the increase of accuracy with implementation of adaptive grids.