Hierarchical surface mesh generation for Wavelet BEM solvers

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We report on our results about surface mesh generation from CAD models. Our method is featured by its ability of generating hierarchical meshes which are very useful for solvers requiring nested trial spaces. To construct wavelets on manifolds the parametric description of the boundary surface is needed.

We need to decompose the boundary of a solid into four-sided patches F_i such that there is a regular mapping γ_i from the unit square to each F_i. Since we use Coons functions to generate the mappings γ_i, all curves are parametrized in arc length so that the functions γ_i match well at surface joints. That result is valid for any blending functions of the Coons patches. We use a reparametrization approach which keeps the shape of the initial curves while achieving arc length parametrization.

The decomposition techniques are applied to real CAD data which come from IGES files. Comments about generalization into 3D solid meshes are provided.

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