

An Automatic and Real-time Computation for Structural Design Based on Reduced-basis

Method

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An automatic and real-time computation approach was suggested to predict the structural behavior of multivariable and large-scale problem in structural design. Computational techniques that used in reduced-basis method, including the affine decomposition, adaptive construction of the subspace and online computation, were connected by some predefined standard procedures. It includes the automatically creating the samples for subspace construction and subspace updating, online FEM solving for new samples and subspace deviation estimation. To save the computational cost, the initial subspace is constructed from a limited sample set. Then, a potential candidate of subspace is indicated and the finite element solving process is carried out. The subspace is updated based on the online computation in a real-time way until the accuracy is satisfied. It is found that the subspace constructed from the automatic approach is of higher accuracy and less in computational efforts.

Keywords: Structural design, Computational method, Reduced-basis method, Real-time computation