

Problems of Application of Hierarchical Modelling, Displacement FEM and a Posteriori Residual Error Estimation to Static and Dynamic Adaptive Analysis of Complex Structures**Grzegorz Zboinski**, Maciej Jasinski*Institute of Fluid Flow Machinery, PAN, Gdańsk, Poland*

The paper addresses the main problems of implementation of the idea of hierarchical modelling in the scope of displacement finite element methods and of application of the a posteriori residual error estimation to adaptive analysis of complex structures. These structures consist of solid, thin- and thick-walled parts and transition zones as well. Our presentation is limited to linear static and linear dynamic (modal) analyses. The main source of the problems under consideration is incompatibility of the various mechanical models forming hierarchy of models for complex structures, locking, improper solution limit and boundary effect sensitivity of the displacement finite element formulation, and similar sensitivity of the a posteriori error estimation by the Element Residual Methods. The elaborated methods of overcoming the mentioned problems are elucidated, if available. For those of the problems which have not been resolved yet, the suggested methods are indicated and their potential for overcoming the problems are thoroughly discussed.

[View the extended summary](#)