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Model Updating a Multicriteria Optimization Process in Mechanics

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Model updating is a widely used area of research in the field of dynamics of elasto-mechanical structures. The ill-conditioned inverse mathematical problem is primarily solved in a sensitivity based numerical process, considering regularization methods. Usually, only modal properties (selected natural frequencies and selected natural mode shapes) and selected data of the frequency response functions are considered in model updating procedure. This contribution shows how additional dynamical properties of the structure can be introduced in the updating process. The elasto-mechanical structure will be modelled by using FE-macro-elements and the model updating will be formulated as a constrained multiobjective optimization problem. In this procedure the parameters of the macro-elements are collected in the unknown design vector. The optimization problem will be solved by a special hierarchical scalarization method in which the errors of each different dynamical property between the mathematical model and measurements will be minimized. Applications will be shown.

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