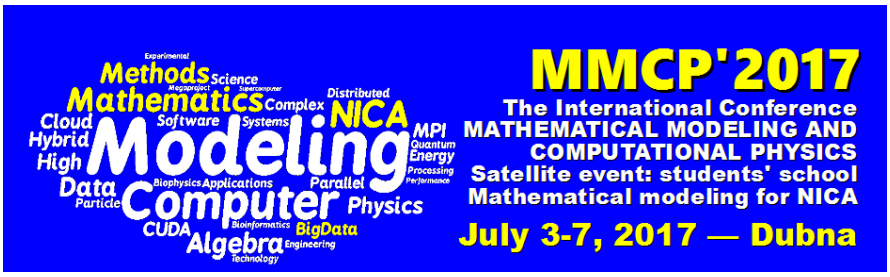

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Wavelet-Based Numerical and Semianalytical Methods of Local Structural Analysis in Engineering

Monday, 3 July 2017 14:30 (15 minutes)

Numerical or semianalytical solution of problems of structural mechanics with immense number of unknowns is time-consuming process. High-accuracy solution at all points of the model is not required normally, it is necessary to find only the most accurate solution in some pre-known domains. The choice of these domains is a priori data with respect to the structure being modeled. Designers usually choose domains with the so-called edge effect (with the risk of significant stresses that could lead to destruction of structures) and regions which are subject to specific operational requirements. Stress-strain state in such domains is important. Wavelets provide effective and popular tool for local structural analysis.

Operational and variational formulations of problems of structural mechanics with the use of method of extended domain are presented. After discretization and obtaining of governing equations, problems are transformed to a multilevel space by multilevel wavelet transform. Discrete wavelet basis is used and corresponding direct and inverse algorithms of transformations are performed. Due to special algorithms of averaging, reduction of the problems is provided. Wavelet-based methods allows reducing the size of the problems and obtaining accurate results in selected domains simultaneously. These are rather efficient methods for evaluation of local phenomenon in structures.

Short biography note

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