

Analysis of the finite-element model parameters refinement algorithm applicability limits on the basis of the sensitivity coefficients computation

© V.A. Zhulev, I.A. Kiselev, A.A. Pekarev

Bauman Moscow State Technical University, Moscow, 105005, Russia

The methods for selecting the finite-element model (FE model) parameters are presently actively developing so that its behaviour could correspond with the behaviour of the real construction. Generally, the proximity of natural frequencies is accepted as the model and object fitting criterion. However, even when the natural frequencies of the developed model correspond with the actual product, their behaviour can vary significantly. The article shows the limits to the applicability of the FE model's elements rigidity refinement algorithm by the experimental values of natural frequencies as exemplified by the simple model of the elastic system having the precise analytical solution for the values of natural frequencies and vibrational modes. The test model considered allows checking the adequacy of the refinement algorithm by natural frequencies of vibration depending on the degree of the system's elastic parameters initial deviation from the calibrated values as well as the degree of the natural modes initial differences. The work results show the need for the additional accounting of discrepancies by natural modes to prevent the rough errors of refining the FE models by the natural frequencies from occurring.

Keywords: FE models refinement, FE models verification, sensitivity coefficient

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Zhulev V.A., post-graduate, Department of Applied Mechanics, Bauman Moscow State Technical University. Research interests: sensitivity coefficient, FE model verification, modal analysis. e-mail: vlzh92@gmail.com

Kiselev I.A., Cand. Sc. (Eng.), Assoc. Professor, Department of Applied Mechanics, Bauman Moscow State Technical University. Research interests include: numerical simulation, finite elements method, cutting process dynamic simulation. e-mail: i.a.kiselev@yandex.ru

Pekarev A.A., student, Department of Applied Mechanics, Bauman Moscow State Technical University. e-mail: pekarev123andrey@gmail.com