

FINITE SUPERELEMENT METHOD FOR ELASTICITY PROBLEMS

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In our work we consider Fedorenko Finite Superelements Method (FSEM) ([1]) for 3d elasticity problems with sharp nonhomogenities. We consider 3d composite media with a number of fibres. Diameters of fibres are greatly smaller then diameter of the whole body. Elasticity properties of the matrix and fibre are different.

We introduce variational equation which natural Petrov-Galerkin approximation leads to Fedorenko Finite Superelemet Method (FSEM). FSEM is considered as Petrov-Galerkin approximation of the certain problem for traces of boundary-value problem solution at the boundaries of some subdomains (superelements). Iterative methods of solution of the same problem are well known domain decomposition methods.

To construct finite dimensional approximations we use theoretical approach developed previously for 2d elliptical problems ([2]-[4]) and based on the theory of Poincare-Steklov operators and variational equations.

Some numerical results are presented.

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REFERENCES

- [1] R.P. Fedorenko. *Inroduction into computitional physics*. Moscow, MFTI Publishing, 1994. (in Russian)
- [2] M. Galanin and E. Savenkov. Fedorenko finite superelement method as special Galerkin approximation. *Math. Model. Anal.*, **7** (1), 2001, 41 - 50.
- [3] M.P. Galanin, and E.B. Savenkov. Substantiation of the finite superelement method. *J. of Comp. Math. and Math. Phys.*, **43** (5), 2003, 711 - 727.
- [4] M.P. Galanin and E.B. Savenkov. On the relations beetwin finite superelement method and projection methods. *Preprint KIAM of RAS*, (67), 2001.