

UDK 539.4.01:512.3

AALTO, JUKKA and SALONEN, EERO-MATTI, Analysis of incompressible material by initial stress iteration. *Rakenteiden Mekaniikka* 6 (1973) 2, p. 67...98.

Pure displacement method cannot be used in connection with incompressible material. The article explains how this difficulty can be avoided by performing the analysis on compressible material and by adding suitable imaginary initial stresses which take into account the incompressibility condition. The unknown initial stresses are determined by an iterative process. The method can also be used for nearly incompressible materials when the normal displacement method can give rise to numerical inaccuracies.

The principle of the method is gone through in plane strain case and the theory obtained is then applied for a simple analytical example. For practical purposes the use of the method in conjunction with the finite element discretization process is also explained and some examples using isoparametric elements are finally presented. The method can also be used in problems of creeping incompressible viscous flow due to the analogy with the incompressible elastic solid.

UDK 512.3:513.73  
532.5

ORIVUORI, SEPPO and LAINE, HARRY, Application of finite element method to the solution of quasiharmonic equation. *Rakenteiden Mekaniikka* 6 (1973) 2, p. 99...113.

The article deals with the quasiharmonic equation. The functional minimizing of which is equivalent to the solution of the quasiharmonic equation is derived using a method corresponding to the principle of the virtual work. The 'stiffness'-matrix of a general element is derived in order to solve the equation. The method is applied to solve potential flow of coolingwater of a nuclear powerstation. The 'stiffness'-matrix of a triangular and a rectangular element is presented. The velocity-fields of the flow problems are presented.