

# The present status of the FDEM (Finite Difference Element Method) program package

Willi Schnauer

`schoenauer@rz.uni-karlsruhe.de`

Rechenzentrum der Universität Karlsruhe, Germany

The FDEM program package is a black-box solver for nonlinear systems of 2-D and 3-D elliptic and parabolic (algebra) PDEs. The solution is by a FDM of arbitrary consistency order  $q$  (practically used are  $q=2, 4, 6$ ) on an unstructured FEM mesh. A sophisticated algorithm has been developed to generate the difference formulae of order  $q$  and by the formulae of order  $q+2$  an error estimate from the data given by a (commercial) mesh generator. The knowledge of the error permits an order control and a mesh refinement to meet a given relative tolerance. Jumps in the coefficients of the PDEs or coupled domains with different PDEs are treated by dividing lines/surfaces. The solution process uses many tuning parameters in the sense of "numerical engineering". The present status of the FDEM program package is discussed and illustrated by typical examples. The further development towards moving grid is discussed.