

FRÖHLICH PRIZE: citation for Françoise Tisseur

Short citation:

Professor Françoise Tisseur, of the University of Manchester, is awarded a Fröhlich Prize for her important and highly innovative contributions to the analysis, perturbation theory, and numerical solution of nonlinear eigenvalue problems.

Long citation:

Professor Françoise Tisseur, of the University of Manchester, is awarded a Fröhlich Prize for her important and highly innovative contributions to the analysis, perturbation theory, and numerical solution of nonlinear eigenvalue problems.

For polynomial eigenvalue problems, Françoise has presented for the first time an analysis that allows comparison of the conditioning (sensitivity) of the original eigenvalue problem and the first order formulation (linearization). She showed that the linearization approach very often is not the best approach from the point of view of perturbation theory and developed detailed recommendations for how to form first order formulations that are optimally robust. Another major breakthrough has been her work on matrix polynomials which are guaranteed to have real eigenvalues and generalize symmetric matrices or definite matrix pencils. A new characterization of this class was given as well as an innovative algorithm for detecting whether a matrix polynomial is in the class. This has major impact also for engineering practice, and Françoise has also developed numerical methods implemented in LAPACK style software for this class. In recent years Françoise has been making major contributions to one of the most challenging problems in the field, the derivation of numerical algorithms that work directly on the nonlinear problem. Further extremely innovative new developments are the use of graph theoretic, algebraic and combinatorial (in particular the max algebra and tropical geometry) methods to improve the stability and robustness of numerical algorithms for nonlinear eigenvalue problems.