1056-35-1397   **Wen-Xiu Ma*** (`mawx@cas.usf.edu`), Department of Mathematics and Statistics, University of South Florida, 4202 E Fowler Avenue, Tampa, FL 33620-5700. *Analytical approaches for solving nonlinear equations.*

There are many direct analytical techniques for solving nonlinear problems, for example, Hirota bilinear method, Wronskian and Casoratian determinant techniques, and Baecklund and Darboux transformations. A general idea behind the existing methods is to decompose nonlinear partial differential equations into integrable ordinary differential equations and then to solve the resulting ordinary differential equations. We wills focus on the transformed rational function method, which provides a systematical and convenient handling of the solution process of nonlinear equations and unifies many existing methods including the tanh-function type methods, the homogeneous balance method, the exp-function method, the mapping method, and the F-expansion type methods. The key point is to search for rational solutions to variable-coefficient ordinary differential equations transformed from given partial differential equations. Applications to higher-dimensional problems show the diversity of exact solutions to nonlinear equations. (Received September 21, 2009)