

# Approaches of Linearization in solving Nonlinear PDE

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## Abstract

When nonlinear time-dependent partial differential equations are concerned, a proper linearization of the nonlinear terms is usually the first step. In this presentation, several different approaches of linearization are presented for solving nonlinear transport equation and modified Boussinesq-type of equations. These approaches include the Taylor expansion, Newton method, Hopf-Cole transformation, and a preprocessing with compact methods. Spatial discretization methods such as high order compact method, finite element, and spectral element methods are used in resolving spatial derivatives and Euler and Crank-Nicolson methods are used in time for solutions of nonlinear partial differential equations. Results are compared with exact solutions via error analyses and the effectiveness of different approaches are discussed.