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Different splitting methods have been playing an important role in the numerical solution of nonsingular differential equation problems due to their remarkable efficiency, simplicity and flexibility in computations as compared with their peers. Although the numerical strategy is still in its infancy for solving singular differential equation problems arising from many applications, explorations of the next generation decomposition schemes associated with various kinds of adaptations can be found in many recent work. In the talk, key explorations will be given to two particularly interesting issues, that is, direct solutions of degenerate singular reaction-diffusion equations and nonlinear optical wave equations. Simulated results will also be given. (Received August 06, 2009)