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Kuppalapalle Vajravelu* (vajravel@mail.ucf.edu), Professor and Associate Chair,
Department of Mathematics, University of Central Florida, Orlando, FL 32816. *Boundary Value
Problems Arising in Diffusion of Chemically Reactive Species in a Porous Medium.*

Solutions for a class of nonlinear second order differential equations, arising in diffusion of chemically reactive species in a porous medium, are obtained. Furthermore, using the Brouwer fixed point theorem, existence results are established. Moreover, the exact analytical solutions (for some special cases) are obtained. The results obtained for the diffusion characteristics reveal many interesting behaviors that warrant further study of the effects of reaction rate on the transfer of chemically reactive species. (Received September 12, 2005)