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(parimoos@sas.upenn.edu) and **Adam L Prinkey**. *Analysis of Interfaces for the Nonlinear Double-Degenerate Reaction-Diffusion Equation*.

We consider the problem of interface development and local behavior of solutions near the interface in the following Cauchy problem for the nonlinear double-degenerate parabolic PDE with reaction:  $u_t = (|(u^m)_x|^{p-1}(u^m)_x) - bu^\beta, x \in \mathbb{R}, t > 0; u(x, 0) = C(-x)_+^\alpha$ . The problem arises in applications such as heat radiation in plasma, spatial spread of populations, and chemical diffusion through groundwater. The structure of the PDE implies that interface behavior is determined by the competition between diffusion and reaction. The full solution for the reaction-diffusion equation ( $p = 1$ ) was given in 2000 [Abdulla and King, SIAM J. Math. Anal., 32, 2(2000), 235-260] and 2002 [Abdulla, Nonlinear Analysis, 50, 4(2002), 541-560]. Our aim is to apply the methods of these papers to solve the open problem for double-degenerate reaction-diffusion equations ( $p > 1, mp > 1$ ). First we apply the nonlinear scaling method to identify which term dominates in various regions of the  $(\alpha, \beta)$ -parameter space. We then construct super/subsolutions and apply special comparison theorems in irregular domains to prove explicit formulae for the interface and local solution, with precise estimations up to constant coefficients. A WENO scheme is applied and supports our estimates. (Received July 23, 2015)