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Ugur G. Abdulla and **Lamees Alzaki*** (lalzaki2013@my.fit.edu). *Analysis of Interfaces for the Nonlinear Degenerate Second Order Parabolic Equations Modeling Diffusion-Convection Processes.*

We consider Cauchy problem with compactly supported initial function for the nonlinear degenerate second order parabolic PDE

$$u_t = (u^m)_{xx} + b(u^\gamma)_x, \quad m > 1, \gamma > 0, b \in \mathbb{R}$$

modeling diffusion-convection processes arising in fluid or gas flow in a porous media, plasma physics, population dynamics in mathematical biology and other applications. Due to the property of the finite speed of propagation the problem develops interfaces or free boundaries separating the region where solution is positive from the region where it vanishes. We present full classification of the short-time behaviour of the interfaces and local solutions near the interfaces. The interface may expand, shrink, or remain stationary as a result of the competition of the diffusion and convection forces near the interface, expressed in terms of the parameters $m, \gamma, \text{sign } b$, asymptotics of the initial function near its support, and whether interface is the right or left boundary curve. In all cases, we prove the explicit formula for the interface and the local solution with accuracy up to constant coefficients. The methods of the proof are based on nonlinear scaling laws, and a barrier technique using special comparison theorems in irregular domains with characteristic boundary curves. (Received July 27, 2017)