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Ugur G. Abdulla, **Jian Du**, **Jonathan Goldfarb**, **Kev Johnson**, **Lauren Lanier** and **Taylor Schluter*** (taschlute@gmail.com), 150 West University Blvd., Department of Mathematical Sciences, Melbourne, FL 32901. *Analysis of Interfaces for the Nonlinear Diffusion Equation with Linear Convection.*

We investigate interface development in a Cauchy problem for the nonlinear diffusion-convection equation

$$u_t = (u^m)_{xx} + bu_x, x \in R, t > 0; \quad u(x,0) = C(-x)_+^{\alpha}, x \in R,$$

where $m, \alpha, C > 0, b \in R$. It is proved that for the opposing direction of convection ($b > 0$) depending on m, α and C, the interface may initially expand or shrink. For slow diffusion ($m > 1$), the interface expands if $\alpha < 1/(m-1)$ and shrinks if $\alpha > 1/(m-1)$. The behavior of the interface in the case $\alpha = 1/(m-1)$ depends on the constant C. There is a critical value C_* such that the interface expands if $C > C_*$ and shrinks if $C < C_*$. We identify the region in the parameter space where a global self-similar solution exists, and the direction of the interface changes in time: a so called turning interface phenomenon is observed. For the direction of convection ($b < 0$), the interface always expands, and an explicit formula for the interface and local solution is derived in the whole parameter space. For fast diffusion $m < 1$, there is an infinite speed of propagation. In this case, the asymptotics of the solution at infinity agree with those of the diffusion equation. A WENO numerical scheme was applied to the problem and numerical results support our proved estimations. (Received July 21, 2014)