Bounds for blow-up time for porous medium problems

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In this talk we control the blow-up time t^* of unbounded solutions u to the following system, known as *complete Porous Medium Equation*

$$\begin{cases} u_t = \Delta(u^m) + k_1 u^p - k_2 |\nabla u|^q, \quad x \in \Omega, \ t \in (0, t^*), \\ u = 0, \quad x \in \partial\Omega, \ t \in (0, t^*), \\ u = u_0(x) \geq 0, \quad x \in \Omega. \end{cases} \tag{1}$$

In (1), the set Ω is a bounded and smooth domain of $\mathbb{R}^3$, and p, q, k_1, k_2 and m are positive and appropriate constants.

Physically, model (1) is related to the flow of an isentropic gas through a porous medium (see [3]). Moreover, the negative convection gradient term, which has a damping effect, contrast the power source term.

Our main result shows how to derive a lower bound for t^* for blowing up solutions of problem (1), under certain conditions on its data.

References

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