

Asymptotic behavior for the heat equation in nonhomogeneous media with critical density

Razvan Iagar (UV), Ariel Sánchez (URJC)

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We study the asymptotic behavior of solutions to the heat equation in nonhomogeneous media with critical singular density $|\mathbf{x}|^{-2}\partial_t u = \Delta u$, $\mathbf{x} \in \mathbb{R}^N \times (0, \infty)$. The asymptotic behavior proves to have some interesting and quite striking properties. We show that there are two completely different asymptotic profiles depending on whether the initial data u_0 vanishes at $x=0$ or not. Moreover, in the former the results are true only for radially symmetric solutions, and we provide counterexamples to convergence to symmetric profiles in the general case.

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