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Long-time asymptotics of the zero level set for the heat equation

The zero level set $Z(t) := \{\mathbf{x} \in \mathbf{R}^d : u(\mathbf{x}, t) = 0\}$ of a solution u to the heat equation in $\mathbf{R}^d$ is considered. Under vanishing conditions on moments of the initial data, we will prove that the set $Z(t)$ in a ball of radius $C\sqrt{t}$ for any $C > 0$ converges to a specific graph as $t \to \infty$ when the set is divided by $\sqrt{t}$. Solving a linear combination of the Hermite polynomials gives the graph and coefficients of the linear combination depend on moments of the initial data. Also the graphs to which the zero level set $Z(t)$ converges can be classified in some cases.