

Higher order asymptotic expansion for the heat equation with a nonlinear boundary condition

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Abstract. We consider the heat equation in the half space of \mathbb{R}^N with a nonlinear boundary condition. Under the suitable assumption for the nonlinear term, by the standard parabolic arguments we can prove the existence of the solution for any initial datum $\varphi \in L^\infty(\Omega) \cap L^1(\Omega)$, and the solution u behaves like the Gauss kernel as $t \rightarrow \infty$. In this talk, motivated by the work of the speaker and Ishige (to appear in Math. Ann.) to a semilinear heat equation, we consider the problem with

$$\varphi \in X_K := L^\infty(\Omega) \cap \left\{ f \in L^1(\Omega) : \int_{\Omega} (1 + |x|)^K |f(x)| dx < \infty \right\}$$

for some $K \geq 0$, and give the higher order asymptotic expansion for the solution u .