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**Suppression of blow up by mixing mechanism in semilinear heat equations.** (Chinese. English summary) [Zbl 07494976]


Summary: In this paper, we consider the semilinear heat equation with additional mixing mechanism of advection by an incompressible flow. In the absence of mixing mechanism, the solution of the equation is blow up in finite time. Under a suitable mixing condition of the advection, we study global well-posedness of the solution with large initial data. For the classical semilinear heat equation with mixing mechanism, we establish the global $L^p (p > \frac{d}{2})$ estimate of the solution by the energy method, and obtain the global existence of the classical solution. However, for the fractional semilinear heat equation with mixing mechanism, due to technical difficulties, we cannot get the global $L^p (p > 2)$ estimate by the energy method. We establish the global $L^\infty$ estimate of the solution through the nonlinear maximum principle, and obtain the global existence of the classical solution.

**MSC:**

35K05 Heat equation
35K58 Semilinear parabolic equations
35A09 Classical solutions to PDEs
35B50 Maximum principles in context of PDEs

**Keywords:**
semilinear heat equation; blow up; mixing mechanism; nonlinear maximum principle; global solution with large initial data

**Full Text:** DOI