

TRAJECTORY ATTRACTOR AND GLOBAL ATTRACTOR FOR KELLER–SEGEL–STOKES MODEL WITH ARBITRARY POROUS MEDIUM DIFFUSION

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ABSTRACT. We investigate long-time behavior of weak solutions for the Keller–Segel–Stokes model with arbitrary porous medium diffusion in 2D bounded domains. We first prove the existence of the trajectory attractor \mathcal{A}^{tr} for the translation semigroup in the trajectory space. Further, we construct the global attractor \mathcal{A} in a generalized sense. The results are shown by the definition of trajectory attractor and global attractor, and energy estimates.

1. Introduction

When bacteria of the species *Bacillus subtilis* are suspended in water, it can be observed experimentally that spatial patterns may spontaneously emerge from initially almost homogeneous distributions of bacteria [10]. A mathematical model for such processes was proposed in [21], where it is assumed that the essentially responsible mechanisms are a chemotactic movement of bacteria towards oxygen which they consume, a gravitational effect on the motion of the fluid by the heavier bacteria, and a convective transport of both cells and oxygen

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