Well-posedness and stabilization of two-species aerotaxis competitive models

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ABSTRACT

In this talk, we are concerned with the two-species aerotaxis-Navier-Stokes equations with Lotka-Volterra competitive kinetics in a two dimensional domain $\Omega \subset \mathbb{R}^2$.

$$\begin{cases} \partial_t n_1 + (u\cdot\nabla)n_1 - \Delta n_1 = -\nabla\cdot(\chi_1(c)n_1\nabla c) + \mu_1 n_1(1-n_1-a_1n_2), \\ \partial_t n_2 + (u\cdot\nabla)n_2 - \Delta n_2 = -\nabla\cdot(\chi_2(c)n_2\nabla c) + \mu_2 n_2(1-a_2n_1-n_2), \\ \partial_t c + (u\cdot\nabla)c - \Delta c = -(\kappa_1(c)n_1 + \kappa_2(c)n_2), \qquad \text{in } (x,t)\in\Omega\times(0,\infty) \\ \partial_t u + (u\cdot\nabla)u - \Delta u + \nabla P = (\gamma n_1 + \delta n_2)\nabla\Phi, \qquad \nabla\cdot u = 0, \\ \partial_\nu n_1 = \partial_\nu n_2 = \partial_\nu c = 0, \qquad u = 0, \qquad \text{on } \partial\Omega\times(0,\infty), \\ n_1(x,0) = n_{1,0}(x),\ n_2(x,0) = n_{2,0},\ c(x,0) = c_0,\ u(x,0) = u_0(x), \qquad \text{in } \Omega. \end{cases} \tag{1}$$

We consider the general chemotactic sensitivity coefficient function and oxygen(chemical) consumption rate function. We show that the global wellposedness and stabilization of the solution to the system. This result extends the previous results in [1] to some extent.

REFERENCES

1. M. Hirata, S. Kurima, M. Mizukami and T. Yokota,, "Boundedness and stabilization in a two-dimensional two-species chemotaxis-Navier-Stokes system with competitive kinetics", *J. Differential Equations*, Vol. 263, 2017, pp. 470-499.