

Study of a chemotaxis system coupled with a fluid in a distributed control problem framework.*

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Abstract

Chemotaxis is understood as the biological process in which the presence of living organisms activates the production of a certain chemical substance. In this process, the movement of organisms in response to a chemical stimulus can be given towards a higher or lower concentration of the chemical substance (positive or negative chemotaxis, respectively). We analyze a stationary biological system coupled with a fluid governing by the Navier-Stokes equations and subject to homogeneous boundary conditions (of Neumann type for the biological variables, and of Dirichlet type for the velocity). Some existence results are given through the study of a distributed control problem. In addition to the existence of optimal solution, we derive some optimality conditions.

References

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