Existence of solutions for a Keller-Segel model coupled to fluid equations

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We consider a coupled system of Keller-Segel type equations and the incompressible Navier-Stokes equations which is describing the dynamics of oxygen, swimming bacteria, and viscous incompressible fluids. We show the existence of weak solutions of the system. To prove the existence result, we exploit mass transportation theory to understand the equation for the density of bacteria and we formally interpret it as sum of two flows in the Wasserstein space. Based on this observation, we apply a sort of splitting scheme to solve the equation for the density of bacteria, and then we finally solve the coupled system. This is a joint work with Kyungkeun Kang.