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Coupling of a protein-laden air/water interface to a shearing bulk flow. ALI AZADANI, Rensselaer Polytechnic Institute, JUAN LOPEZ, Arizona State University, AMIR HIRSA, Rensselaer Polytechnic Institute — Understanding the structure of proteins and other bio-molecules such as RNA is essential to the development of pharmaceuticals. Detailed structural data is obtained by techniques that rely on crystallization. 2D protein crystallization on lipid monolayers at a quiescent air/water interface is now a well-established process, but it only operates under a very restricted set of conditions and on a very slow time scale. We have recently been able to significantly extend the conditions under which the proteins will crystallize as well as speed up the process by subjecting the interface to a shearing flow. Here, using experimental measurements and computational simulations, we investigate the coupling between a protein-laden film and the bulk flow that provides the interfacial shear. This flow in a stationary open cylinder is driven by the constant rotation of the floor. Despite the huge range of length scales involved, a good description of the resultant interfacial velocity field has been obtained using a fairly standard macroscale Newtonian interface model, albeit with variable surface shear viscosity to provide a macroscale description of the molecular scale processes.

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