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Janus droplet motion in an external flow SERGEY SHKLYAEV, Department of Chemical Engineering, University of Puerto Rico, ANDREY IVANTSOV, Institute of Continuous Media Mechanics UB RAS, MISAEL DIAZ, UBALDO M. CORDOVA-FIGUEROA, Department of Chemical Engineering, University of Puerto Rico — We consider a hydrodynamics of a Janus droplet, which consists of two hemispherical domains occupied by different liquids. The simplest problem, a Janus droplet in a uniform at infinity flow, is analyzed. The interfaces are assumed weakly deformable. It is shown, that the velocity field can be represented as a superposition of two fields: for internal surface (i) normal and (ii) parallel to the external flow. In case (i) the flow is axisymmetric; the force imposed on the droplet is found by summation of the series. It is worth noting, that even for equal internal viscosities, the solution for a simple drop [1,2] is not reproduced. Indeed, the internal impermeable interface prohibits a flow of Hadamard-Rybczynski type. Weak deformation of the interfaces is found; it is shown that deformation of the internal surface is larger than that of the drop surface. In case (ii) expansion in Lamb's functions is applied; both the torque and force are found. It is also shown that stable configuration of a torque-free droplet corresponds to case (i) with less viscous fluid on the upstream face.

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