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Oscillatory flow and induced steady streaming flow around two spheres DAVID FABRE, IMFT, University of Toulouse, JAVERIA JALAL, JUSTIN LEONTINI, RICHARD MANASSEH, Swinburne University of Technology — We investigate the flow around two fixed spheres of identical radius, subjected to a oscillating flow at frequency ω and weak amplitude u_a. Expanding the flow in series of u_a, the leading order corresponds to an oscillating flow with zero mean, while the second-order correction contains a steady streaming component. Thanks to a modal decomposition in the azimuthal direction, we are able to reduce the problem to a few linear problems in a 2D domain corresponding to the meridional (r, z) plane. Investigation of the streamlines of the steady component of the flow shows intricate patterns due to the interaction between the streaming flows induced by both spheres. The analysis also allows to compute the mean forces felt by both spheres. If the spheres are aligned obliquely with respect to the oscillating flow, they experience a lateral force which tend to realign them in a transverse configuration. In this transverse configuration, they experience an axial force which can be either attractive or repulsive. At high frequencies the force is always attractive. At low frequencies, it is repulsive. At intermediate frequencies, the force is attractive at large distances and repulsive at small distances, leading to the existence of an equilibrium configuration.

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