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Mobility functions of a spheroidal particle near a planar elastic membrane ABDALLAH DADDI-MOUSSA-IDER, Biofluid Simulation and Modeling, Universität Bayreuth, Universitätsstraße 30, 95440, Bayreuth, Germany, MACIEJ LISICKI, Department of Applied Mathematics and Theoretical Physics, Wilberforce Rd, Cambridge CB3 0WA, United Kingdom, STEPHAN GEKLE, Biofluid Simulation and Modeling, Universität Bayreuth, Universitätsstraße 30, 95440, Bayreuth, Germany — Using an analytical theory, we compute the leading order corrections to the translational, rotational and translation-rotation coupling mobilities of a prolate spheroid immersed in a Newtonian fluid and moving nearby an elastic cell membrane. The corrections are expressed in terms of the spheroid-to-membrane distance, spheroid orientation and the characteristic frequencies associated with membrane shearing and bending. We find that the corrections to the translation-rotation coupling mobility are primarily determined by bending resistance whereas shearing elasticity manifests itself in a more pronounced way in the rotational mobility. We further demonstrate the validity of the analytical approximation by close comparison with boundary integral simulations of a truly extended spheroidal particle. The analytical calculations are found to be in a good agreement with the numerical simulations over the whole range of the applied frequencies.

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