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Sources of force oscillations from an immersed boundary method for moving-body problems¹ JONGHO LEE, JUNGWOO KIM, HAECHEON CHOI, Seoul National University, KYUNG-SOO YANG, Inha University — Although the immersed boundary method has been successfully applied to stationarybody problems, it produces force oscillations when applied to moving-body problems. In the present study, we identify two important sources of force oscillations from an immersed boundary method. One is from pressure discontinuity in space across the immersed boundary, which is caused by discrete momentum forcing applied at the grid points where solid becomes fluid with body motion. The other is from velocity discontinuity in time according to the body motion. It is shown that the mass source/sink proposed by Kim, Kim & Choi (2001, JCP) reduces the force oscillations by alleviating the pressure discontinuity in space. The velocity discontinuity occurs in time at the grid points where fluid becomes solid with body motion. The amount of velocity discontinuity significantly depends on local grid size and becomes smaller with smaller grid size.

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