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**An improved direct-forcing immersed boundary method for fluid-structure interaction of a flexible filament**[1] XING ZHANG, XIAOJUE ZHU, Institute of Mechanics, Chinese Academy of Sciences — We present an improved immersed boundary method for the simulation of fluid structure interaction (FSI) of a slender body. Our numerical method is based on the one proposed by Wang and Zhang (J. Comput. Phys. 30:3479-3499, 2011). Although an accurate prediction of total force can be achieved by using this method, unphysical spatial oscillation is observed in the force distribution. This oscillation is detrimental to the prediction of structure response in FSI. In this work, several modifications are made to improve this method. Firstly, the implicit forcing is replaced by an explicit forcing. Secondly, a more consistent way of computing each component of the forcing on a staggered mesh is proposed. Thirdly, for a slender body of zero thickness, the discrete delta-function with a "negative-tail" is adopted for the interpolation at the endpoints. Numerical simulations are performed to test the efficacy of the modifications. It is found that the measures taken successfully reduce the oscillation and the results obtained agree well with those from the literatures.

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