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A gluey particle model. (English) Zbl 1359.76112
ESAIM, Proc. 18, 133-142 (2007).

Summary: We present here a new framework to handle the short-range interaction between rigid bodies in a viscous, incompressible fluid. This framework is built as the vanishing viscosity limit of a lubrication model. We restrict ourselves here to the case of a single particle and a rigid wall. Our approach is based on a standard first-order approximation for the lubrication force between two rigid bodies, where a small parameter ε plays the role of the underlying fluid viscosity. We establish convergence when ε goes to 0 of a subsequence of trajectories towards a solution to a problem of the hybrid type: it relies on two distinct states, unglued and glued, the latter being described by a new variable γ which expresses in a way the asymptotic smallness of the distance, and which plays the role of an adhesion potential. The limit problem has a surprising property: although it is well-posed in many situations, uniqueness does not generally hold as soon as left-hand clusters of contact times are allowed. Some prospective extensions of this model (other types of singularities, roughness of surfaces, macroscopic version) are proposed.

MSC:

[76D99](#) Incompressible viscous fluids
[76D08](#) Lubrication theory
[76M25](#) Other numerical methods (fluid mechanics) (MSC2010)

Cited in **5** Documents

Keywords:

[fluid particle flows](#); [lubrication](#); [hybrid systems](#); [non-uniqueness](#)

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