

Second-Gradient fluids from theory to applications

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Abstract

Second-gradient fluids are (possibly) linear fluids where the power expenditure involves second derivatives of the velocity field. Often seen as perturbations of linear first-gradient fluids (the usual ones), they have received in the last year more and more attention and finally a theoretical setting in which they can be seen as a successful modelization of some kind of complex materials.

Moreover, they exhibit some features that can be used in real applied problems, namely those related to thin structures, generally not visible in the analytical setting of first order newtonian fluids.

In the simplest case, they lead to an equation similar to Navier-Stokes' but with a bilaplacian, although, being described by a third-order hyperstress tensor, they may have a big variety of constitutive equations.

Keywords: Second-order materials, Hyperstress, Bilaplacian.

References

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