Artificial Stress Diffusion in Numerical Simulations of Viscoelastic Fluids Flows

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Talk Abstract

Numerical simulations of viscoelastic fluid flows continue to be a very challenging problem for high values of Weissenberg ($\mathcal{W}e$) especially due the High Weissenberg Number Problem (HWNP) [2]. The HWNP is characterized the instability of the numerical solution for higher values than some critical value of the parameter $\mathcal{W}e$ [3]. The most widely used stabilization methods consists on the introduction of an extra (artiffcial) numerical diffusion term into the transport equations for viscoelastic stress tensor, at the discretization stage, leading to more stable simulations [1]. However, we should have special care to keep the modified model consistent with the original problem because the additional term affect the solution of the problem [4].

In this talk, several variants of tensor artificial diffusion are presented, focusing on practical aspects of its implementation and use.

Keywords: Finite Element Method, Oldroyd-B Fluid, Numerical Stabilization, Stress Diffusion.

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