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Symmetric factorization of the conformation tensor in viscoelastic fluid models BECCA THOMASES, University of California, Davis, Dept. of Mathematics, NUSRET BALCI, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, MICHAEL RENARDY, Virginia Tech, Dept. of Mathematics, CHARLES DOERING, University of Michigan, Ann Arbor, Dept. of Physics and Mathematics — The positive definite symmetric polymer conformation tensor possesses a unique symmetric square root that satisfies a closed evolution equation in the Oldroyd-B and FENE-P models of viscoelastic fluid flow. When expressed in terms of the velocity field and the symmetric square root of the conformation tensor, these models' equations of motion formally constitute an evolution in a Hilbert space with a total energy functional that defines a norm. Moreover, this formulation is easily implemented in direct numerical simulations resulting in significant practical advantages in terms of both accuracy and stability.

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