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Shear-induced diffusion of non-Brownian suspensions using a colored noise Fokker-Planck equation[1] LAURA LUKASSEN, MARTIN OBERLACK, Chair of Fluid Dynamics, TU Darmstadt / Graduate School of Excellence Computational Engineering — In the Literature, shear-induced diffusion resulting from hydrodynamic interactions between particles, is described as a long-time diffusion. In contrast to the well-known Brownian diffusion which is described by a white noise force, several authors report that the former type of diffusion exhibits the particularity of a much longer correlation time of velocities. Further, Fokker-Planck equations describing this process of shear-induced diffusion have mostly been derived in position space. We present a considerably extended framework of the shear-induced diffusion problem, which essentially relies on the Markov process assumption under the consideration of long correlation times. Applying the mathematical machinery of Markov processes and Fokker-Planck equations, we conclude that this process may only be properly modelled by a Fokker-Planck approach if written in both position and velocity space. With this complementation we observe, that the long correlation times enter as a colored noise velocity. As a result, the Fokker-Planck equation also needs to be extended and we derive the Fokker-Planck equation for the shear-induced diffusion problem following the definitions of a colored noise Fokker-Planck equation.

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