# Splitting Approaches for Fokker-Planck Equations: Theory and Applications

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We are motivated to solve the Fokker-Planck (FP) equation, which is a partial differential equation in statistical mechanics. The FP equations are applied in plasma physics, e.g., particle collision terms in the wel-known Boltzmann equation, see [1], or fluid dynamics, e.g., thin film formation and growth, see [2]. Further, the solution of the FP equation can be written as a stochastic process with the Langevin equation.
Mathematically, we are interested on solving the FP equations with respect to splitting approaches, which allows to accelerate the solvers, see [3].
We discuss the two possible splitting approaches:

- FP-splitting: We apply the operator splitting of higher order parabolic equations, see [4].
- Langevin-Splitting: We apply the operator splitting of stochastic processes, see [5].

The numerical analysis of the splitting approaches with respect to error estimates are presented. Further, we discuss possible flexibilisations to control problems of stochastic processes, see [6]. Numerical experiments of a plasma and thin-film models are discussed.
At the end of the talk, we summarize our results.

References

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