Operator splitting boosts simulation efficiency

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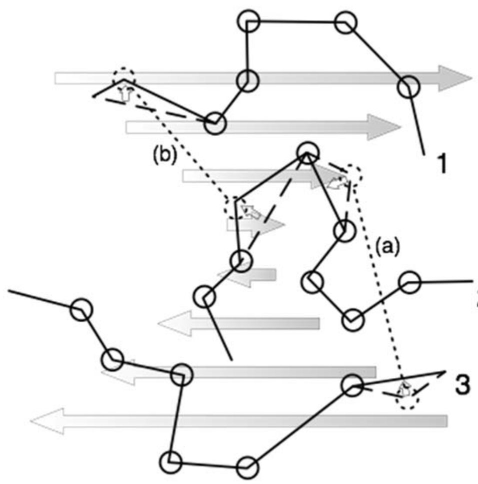
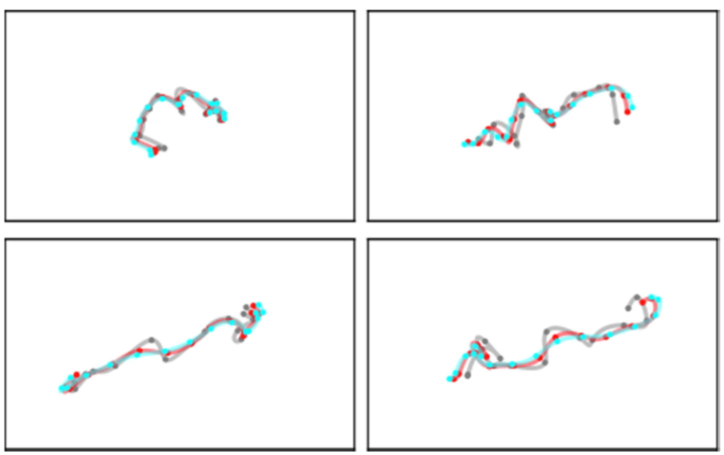


Schematic of sliplink simulation
for entangled polymers in shear flow



Snapshots from operator splitting simulation
with increasing timestep (black, red, blue)
demonstrates improved stability

Problem:

•Many polymer dynamics simulations (e.g., sliplink models for entangled polymers in shear) are built on the Rouse model

•Simulating the Rouse model is time-consuming

Approach:

•Rouse model with noise and flow exactly solvable in terms of Rouse modes, allowing *arbitrary* timestep

•Sliplink constraints, finite extensibility best handled in "real space"

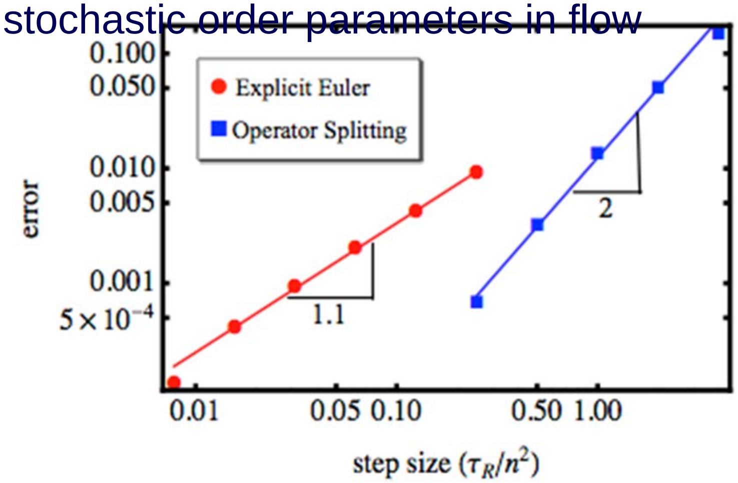
•"Operator splitting": alternate steps of two evolution operators

Results:

•Improved convergence over standard (explicit Euler) method

•Improved stability: *much* larger timestep possible, 5—10x faster

•Method applicable to broad class of simulations of stochastic order parameters in flow



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