# Nonideal rheology of semidilute bacterial suspensions

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The rheology of semidilute bacterial suspensions is studied with the tools of kinetic theory, considering binary interactions, going beyond the ideal gas approximation. Two models for the interactions are considered, which encompass both the steric and short-range interactions. In these, swimmers can either align polarly regardless of the state previous to the collision, or they can align axially, ending up antiparallel if the relative angle between directors is large. In both cases, it is found that an ordered phase develops when increasing the density, where the shear stress oscillates with large amplitudes, when a constant shear rate is imposed. This oscillation disappears for large shear rates in a continuous or discontinuous transition, depending on if the aligning is polar or axial, respectively. For pusher swimmers these nonlinear effects can produce an increase on the shear stress, contrary to the prediction of a viscosity reduction made for th