1023-76-802 **Paula A. Vasquez*** (vasquez@math.udel.edu), 501 Ewing Hall, Department of Mathematical Sciences, University of Delaware, Newark, DE 19716, and **L. Pamela Cook** (cook@math.udel.edu), 501 Ewing Hall, Department of Mathematical Sciences, University of Delaware, Newark, DE 19716. *Modeling Wormlike Micellar Solutions.* Preliminary report.

Surfactants are amphiphilic molecules that can self-assemble in solution. Under certain conditions, they self-assemble into long highly flexible worm-like micelles. While these wormlike structures can entangle, thus exhibiting viscoelastic properties like polymers, unlike polymers they can break and reform continuously and therefore present an additional relaxation mechanism. Experimentally these solutions show distinctive behaviors under different deformation conditions. Here we outline the development of a reaction-diffusion constitutive model incorporating a discrete version of the dynamics of breaking and reforming of micelles proposed by Cates, while modeling each micelle as an element of an elastic network that deforms nonaffinely due to stress dependent breaking events. The model is investigated under homogeneous and nonhomogeneous flow conditions using model parameters that are determined by comparison to experiments with a CpyCl/NaSal micellar solution. In order to explore the importance of the breaking and reforming of the micelles as well as the mechanism of shear banding, several sets of model parameters are analyzed. (Received September 21, 2006)