1152-35-71 **Geng Chen***, University of Kansas, Lawrence, KS 66045, and **Tao Huang** and **Weishi Liu**.

Poiseuille flow of nematic liquid crystals via the full Ericksen-Leslie model.

We study the Cauchy problem of the Poiseuille flow of full Ericksen-Leslie model for nematic liquid crystals. The model is a coupled system of a parabolic equation for the velocity and a quasilinear wave equation for the director. For a particular choice of several physical parameter values, we construct solutions with smooth initial data and finite energy that produce, in finite time, cusp singularities – blowups of gradients. The formation of cusp singularity is due to local interactions of wave-like characteristics of solutions, which is different from the mechanism of finite time singularity formations for the parabolic Ericksen-Leslie system. The finite time singularity formation for the physical model might raise some concerns for purposes of applications. This is, however, resolved satisfactorily; more precisely, we are able to establish the global existence of weak solutions that are Holder continuous and have bounded energy. One major contribution of this paper is our identification of the effect of the flux density of the velocity on the director and the reveal of a singularity cancellation – the flux density remains uniformly bounded while its two components approach infinity at formations of cusp singularities. (Received August 20, 2019)