Molecular Crystals and Liquid Crystals
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gmcl16

Light Scattering in Nematic Liquid Crystals in Non-Equilibrium Steady States

H. Pleiner [a] & H. Brand [b]
[a] Universität Essen, FB, Physik, West Germany
[b] Bell Laboratories, Murray Hill, N.J., USA
Version of record first published: 17 Oct 2011.

To cite this article: H. Pleiner & H. Brand (1983): Light Scattering in Nematic Liquid Crystals in Non-Equilibrium Steady States, Molecular Crystals and Liquid Crystals, 97:1, 423-423

To link to this article: http://dx.doi.org/10.1080/00268948308073169

Mol. Cryst. Liq. Cryst., 1983, vol. 97, p. 423
0026-8941/83/9704–0423/$18.50/0

Printed in the United States of America

Light Scattering in Nematic Liquid Crystals in Non-Equilibrium Steady States

H. PLEINER[†] and H. BRAND[‡]

[†]*Universität Essen, FB Physik, West Germany*
[‡]*Bell Laboratories, Murray Hill, N.J., USA*

(Received January 11, 1983)

Thermal fluctuations in nematic liquid crystals about a non-equilibrium stationary state due to an external temperature gradient or due to an external shear stress are theoretically investigated. The influence of the non-equilibrium situation on the light scattering spectrum (especially on the equilibrium Lorentzian due to transverse director fluctuations) is discussed.

In an external temperature gradient this Lorentzian does not alter its height, but is slightly shifted and is deformed into an asymmetric shape because of the non-equilibrium situation. With the help of a stabilizing magnetic field and by small-angle scattering, it should be possible to resolve experimentally this asymmetry.

By the application of an external shear stress, the spontaneously broken rotational symmetry of nematics is broken externally, too. The equilibrium Lorentzian is (in addition to the trivial Doppler shift) flattened and broadened in a symmetric but non-Lorentzian manner due to wave-vector independent non-equilibrium contributions.

This anisotropy arising from various possible directions of temperature gradient (or shear stress), director, and wave vector has a pronounced effect on the non-equilibrium contributions to the light scattering spectrum.

By the non-equilibrium situation, dynamics and statics are mixed up in an intricate manner.