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Longitudinal complex dielectric polarizability and relaxation times of polar molecules in a biaxial liquid crystal phase YURI KALMYKOV, MEPS, Université de Perpignan, 52 Avenue Paul Alduy, 66860 Perpignan Cedex, France, WILLIAM COFFEY, Department of Electronic and Electrical Engineering, Trinity College, Dublin 2, Ireland, BACHIR OUARI, MEPS, Université de Perpignan, 52 Avenue Paul Alduy, 66860 Perpignan Cedex, France, SERGEY TITOV, Institute of Radio Engineering and Electronics of the Russian Academy of Sciences, Fryazino, Moscow Region, 141190, Russia — The longitudinal relaxation time and the complex dielectric polarizability of rod-like molecules with dipole moment parallel to the long axis in a biaxial nematic liquid crystal are calculated using as model the rotational Brownian motion in a mean field potential so reducing the problem to a set of linear differential-recurrence relations for the appropriate equilibrium orientational correlation functions. The solution of this set is obtained by matrix continued fractions. Simple analytic equations (based on the exponential separation of the time scales of the intrawell and overbarrier (interwell) relaxation processes), allowing one to understand the qualitative behavior of the system and accurately predicting the longitudinal complex polarizability for a wide range of the barrier height and anisotropy parameters, are proposed.

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