Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

On the statistics of Gaussian two and three-dimensional networks: Fluctuations of junctions and collapse driven by structure. MICHAEL LANG, Leibniz-Institute for Polymer Research, Hohe Str. 6, 01069 Dresden, Germany, SERGEY PANYUKOV, P.N. Lebedev Physics Institute, Russian Academy of Sciences, Moscow, Russian Federation, MICHAEL RUBINSTEIN, Department of Chemistry, University of North Carolina, 27599 Chapel Hill, N.C., USA, JENS-UWE SOMMER, Leibniz-Institute for Polymer Research, Hohe Str. 6, 01069 Dresden, Germany — We investigate ideal Gaussian networks both analytically and with computer simulations using the Bond Fluctuation model with and without excluded volume interactions. The focus of this study is on fluctuations and the collapse of networks with different connectivity and dimensionality. We show that the size of a perfect square 2D network made from n^2 Gaussian chains with N monomers each is $R_g \sim N^{1/2} log(n)$. Thus fluctuations in two-dimensional networks diverge logarithmically with the size of these films while fluctuations of three-dimensional networks $\sim N^{1/2}$ and do not increase with their size. We study the cross-over between two and three-dimensional networks by following the dependence of junction fluctuations on the thickness of films. The results of model systems are compared with more realistic networks in order to understand the effect of disorder on the properties of the network and fluctuations of network junctions.

Michael Lang
Leibniz-Institute for Polymer Research, Hohe Str. 6, 01069 Dresden, Germany

Date submitted: 15 Nov 2007 Electronic form version 1.4