Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

On chain statistics and entanglement of flexible linear polymer melts SHI-QING WANG, University of Akron — In this work the chain statistics of most linear flexible polymers have been found to be rather universal, allowing chain entanglement to be depicted with few parameters. We first show, to our surprise, based on the literature data of most familiar linear polymers that (a) at the same number of backbone bonds most linear polymers have comparable coil size and are similarly flexible in spite of widely varying chain thickness and (b) the Kuhn length involves a similar number of backbone bonds. The packing model is found to describe the onset molecular weight Me obtained from the elastic plateau modulus whereas all other models in the literature fail to provide good correlation. It is chain thickness not stiffness that correlates with Me for over one hundred flexible linear polymers. On the other hand, other models such as percolation model appear to provide some crude correlation for Mc, to which the packing model does not apply well, where Mc denotes the point of departure in the molecular weight scaling from Rouse like to reptation like. Thus, our analysis clarified the apparent contradiction among the various models.

Shi-Qing Wang
University of Akron

Date submitted: 13 Nov 2008 Electronic form version 1.4