**Homework 2**

**Polymer Physics 2023**

**Due Tuesday January 24 at noon**

(Please send one email with a **pdf** attachment to beaucag@uc.edu)

Everaers R, Karimi-Varzaneh HA, Fleck F, Hojdis N, Svaneborg C *Kremer−Grest Models for Commodity Polymer Melts: Linking Theory, Experiment, and Simulation at the Kuhn Scale* Macromolecules **53** 1901-1916 (2020) discuss the use of the Kuhn unit as the touch point between coarse grain simulations and experimental data, particularly, *n*K which is the number of Kuhn units in a Kuhn volume, *l*K3. The Kremer-Grest model is a bead-spring model that forms the basis of most computer simulations of polymer chains.

a) Equation (5) relates *h* and *z*. Explain this relationship.

b) Derive equation (6) using *D*K = *k*B*T*/*z*K and Stokes Law for *z*K.

c) Explain the origin of equation (11). How does it relate to *C*n or *C*∞?

d) Derive equation (12).

e) Equation (15) indicates that *N*eK (number of Kuhn units between entanglements) only depends on *n*K, equation (3), since *a* is a universal constant, 18. Explain both logically and mathematically why this is the case.