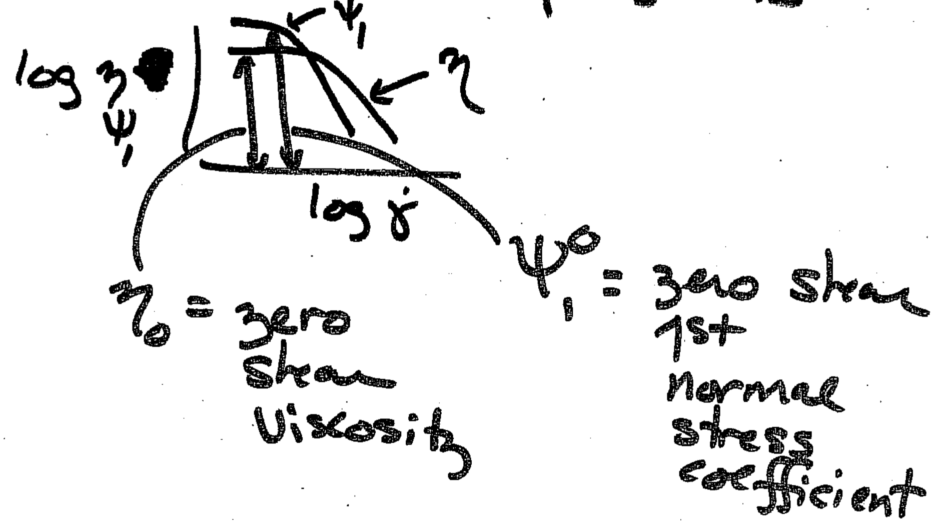
Experimental Data Summary

(1)

Spring 07 CM4650

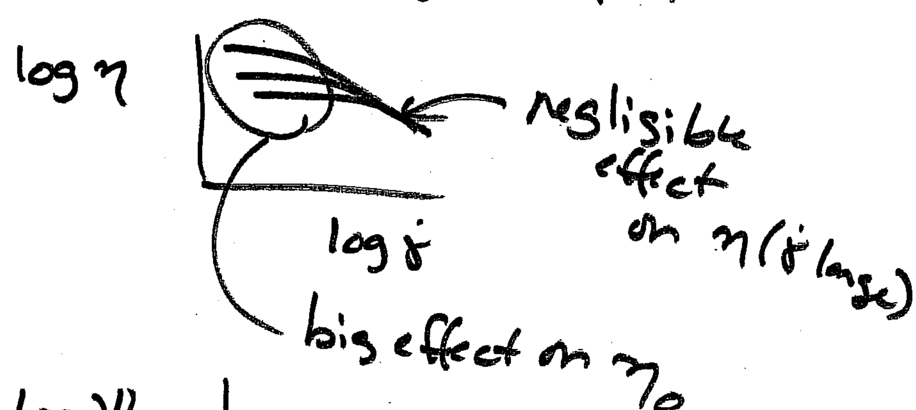
1. Steady shear linear polymers

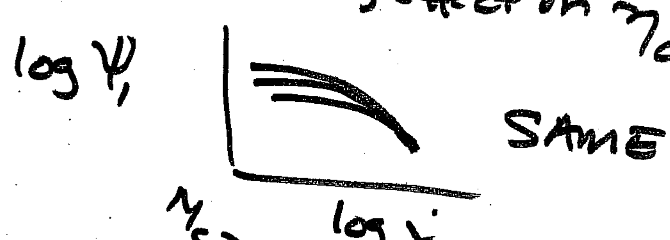
(A)

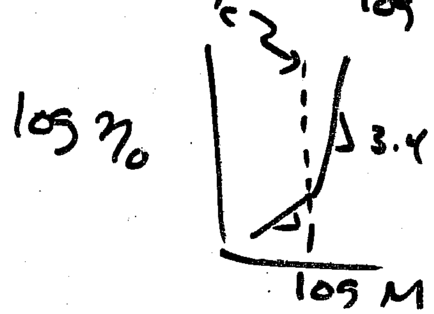


(2)

(B) Molecular Weight effect

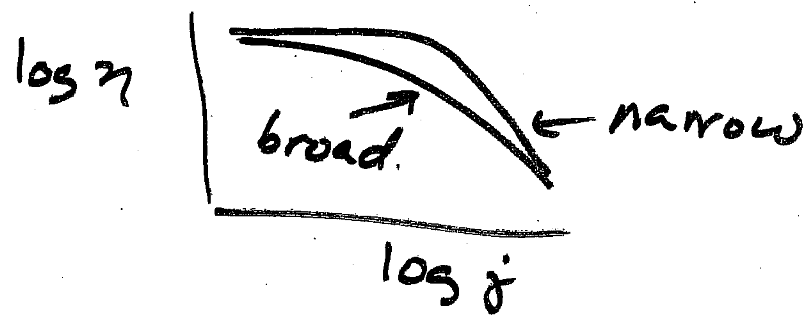






} will discuss more.

(C) MW distribution Effect



(2) Steady shear on Branched Materials

- complex, especially at low γ̇
- at high rates, polymers disentangle, + this lowers η

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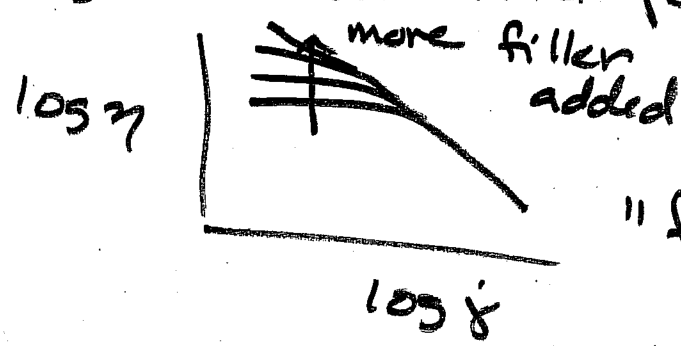
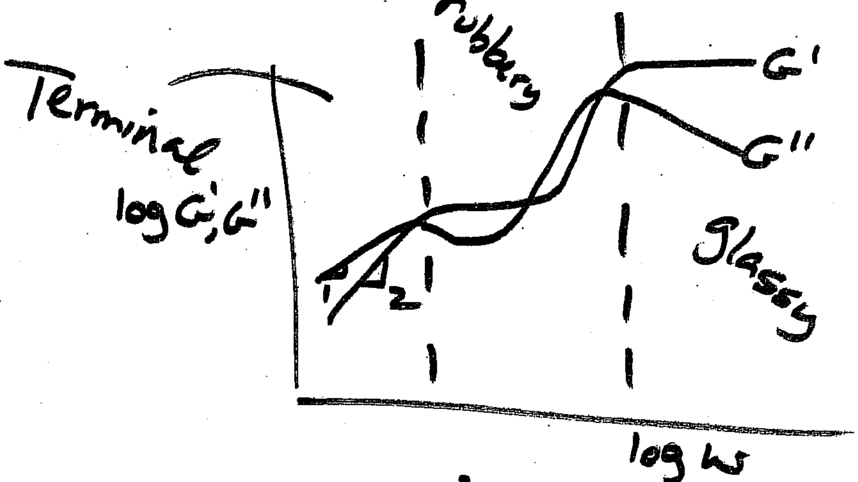
(3) Steady Shear on Filled polymers



"filler effect"

no filler effect at high shear rate

(4) SAOS on linear polymers, high MW



See Ferry for more

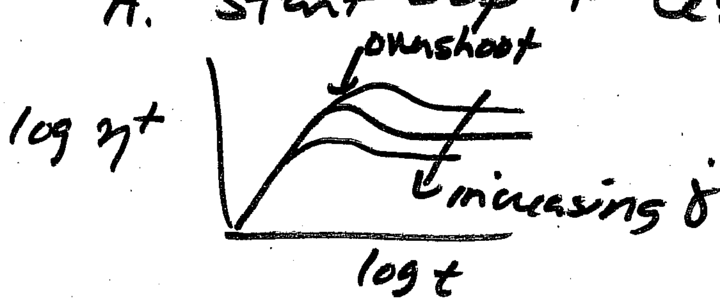
low ω $G' \propto \omega^2$
$G'' \propto \omega$

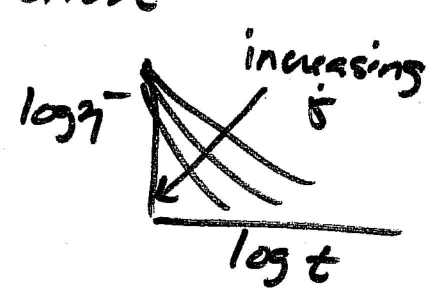
intermediate ω G' goes to plateau $\sim 10^5$ Pa
high ω G' plateaus at 10^9 Pa
breadth of rubbery plateau $\propto$ MW

Temperature has strong effect on SAOS + other rheological functions (See Text)

(5) Nonlinear Rheological Behavior

A. Start-up + Cessation





(7)

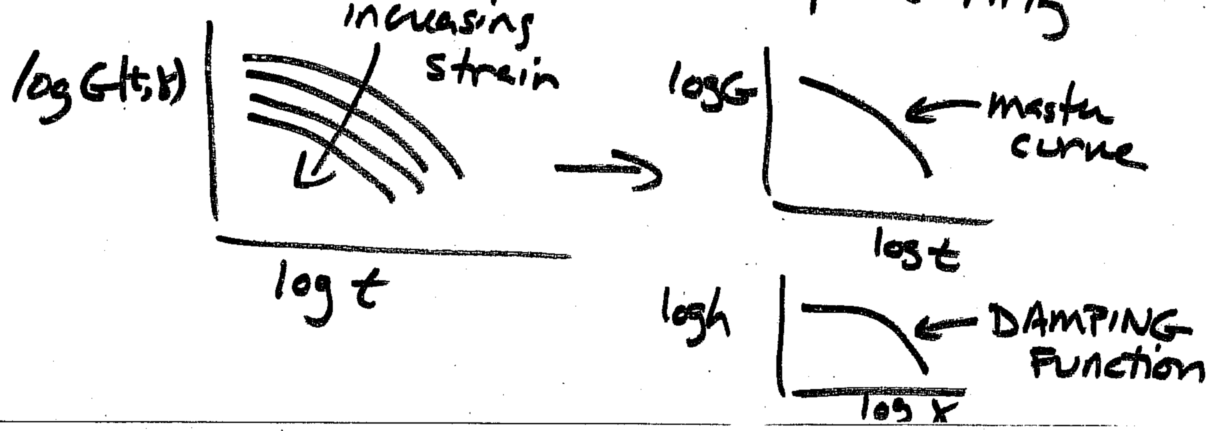
B. Large Amplitude Step Strain

$G(t)$ – linear modulus

$G(t, \gamma_0)$ – nonlinear modulus

$$G(t, \gamma_0) = G(t)\, h(\gamma_0)$$

time-strain separability



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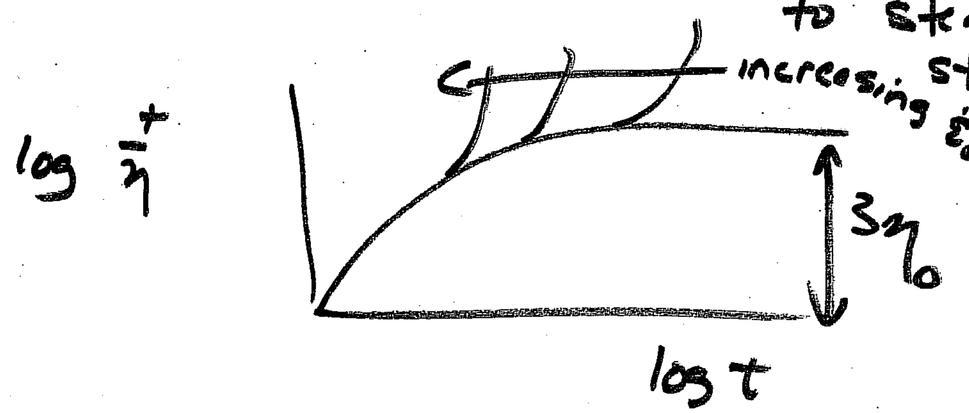
(8)

⑥ Elongational Flow Behavior

$\bar{\eta}$ at low $\dot{\varepsilon}_0 \simeq 3\eta_0$

Trouton's Law

at high rates $\bar{\eta}^+$ does not come to steady state



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