

## CHAPTER IV CONCLUSIONS

Slip mechanisms of high density polyethylenes were investigated by using cone and plate rheometer in dynamic mode.  $G^*$  was monitored as a function of time in order to determine the critical conditions for the slippage.

1. At critical conditions, at the temperatures of 160 and 180°C, in linear viscoelastic regime (LVR), the decay in complex modulus  $G^*$  is caused by (I) desorption between adsorbed polymer chains and the solid wall and (II) void formation. In nonlinear viscoelastic regime (NVR), decays in complex modulus is solely caused by desorption of polymer chain.

2. Different results were obtained at 200°C, where complex modulus rises and decays depending on the frequency imposed. Rises in  $G^*$  is caused by crosslinked networks that formed during the long period of experiment. Decays in  $G^*$  is caused by void formation.

3. At the temperatures of 160 and 180°C, in LVR,  $\Delta\theta_{asymptotic}$  is independent of strain rate because the strain is too low and the rate of desorption between adsorbed polymer chains and wall is equal to the rate of adsorption. In NVR,  $\Delta\theta_{asymptotic}$  critically depends on strain rate because the strain rate is sufficiently high and the polymer chains have no time to relax.

4. At long period after slippage occurs, at large strain rate the slip mechanism is caused by desorption but at low strain rate, desorption is not the slip mechanism.

5. Slip length is independent of temperature only in LVR but  $b$  decreases with  $V_s$  in NVR.