Conclusion

After this first part, concerning the phenomenological view, this second part deals with an approach to rationalize the three phenomena :

- die swelling, melt fracture, capillarity.

These can be taken the main sources of instability and so the limitation of the spinning process at least concerning the extrusion and the drawing zone.

The die swell can be calculated through the experimental value of the recoverable shear strain which is also in function of elastic modulus and so polymer molecular weight, its distribution and temperature. The die swell has been treated also taking into accqunt also the external forces: attenuating force from the winding machine and the surface tension.

The melt fracture has been treated considering also the effect of the shape capillary which seems to affect the critical shear stress values. More experiments need to optimize both the best angle of tapered nozzle and materials for the spinneret.

The capillary effect has been related with the so called 'spinnability properties' of the liquid.

The oscillation of the drawing zone can be predicted in function of the ratio between surface tension and viscosity of liquid.

This investigation has led our research to approach the rationalization of the glass spinning and also the possibility of spinning molten metals.

The results, obtained so far, strengthen more and more our opinion that this approach could help any engineer involved in spinning process.

Further work intends to deal with other sources of spinning limits along the solid zone in order to complete our investigation in this matter.

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