HOME OF RHEOLOGY

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Rotational Online Rheometer (ROR)

Technical data

- Oscillation frequency 0,1-50Hz
- Oscillation deformation ±0,01° (±) – ∞; Rotation
- Maximum circular frequency 314 1/s
- Maximum shear rate in transient mode 500 s-1

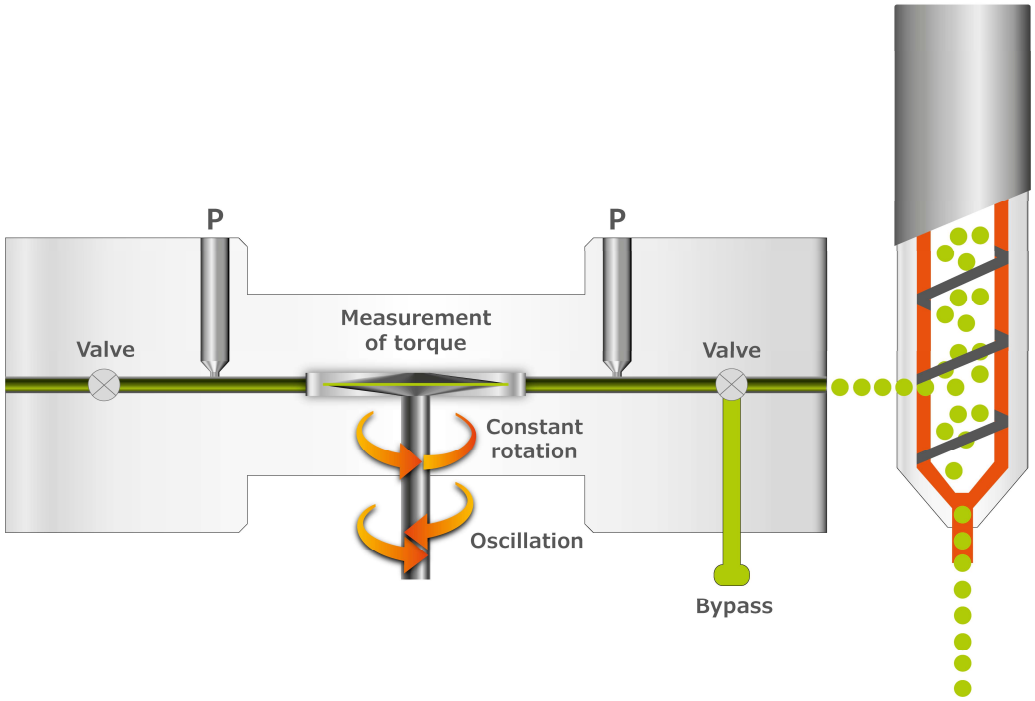
Rotational Online Rheometer (ROR)

Operation Modes

- Frequency sweep
- Amplitude sweep
- Temperature sweep
- Ramp- Relaxation test with continuous deformation angle
- Transient Viscosity with continuous rotation
- Measurement at different hydrostatic pressures (pressurized measurement up to 400bar)
- Prove of accuracy by the measurement of different polyolefins with comparison data from Ares cone/plate rheometer

Rotational Online Rheometer (ROR)

General setup

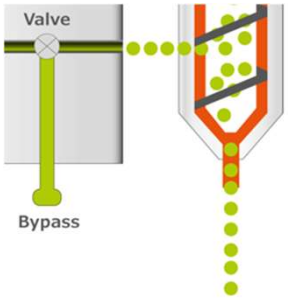


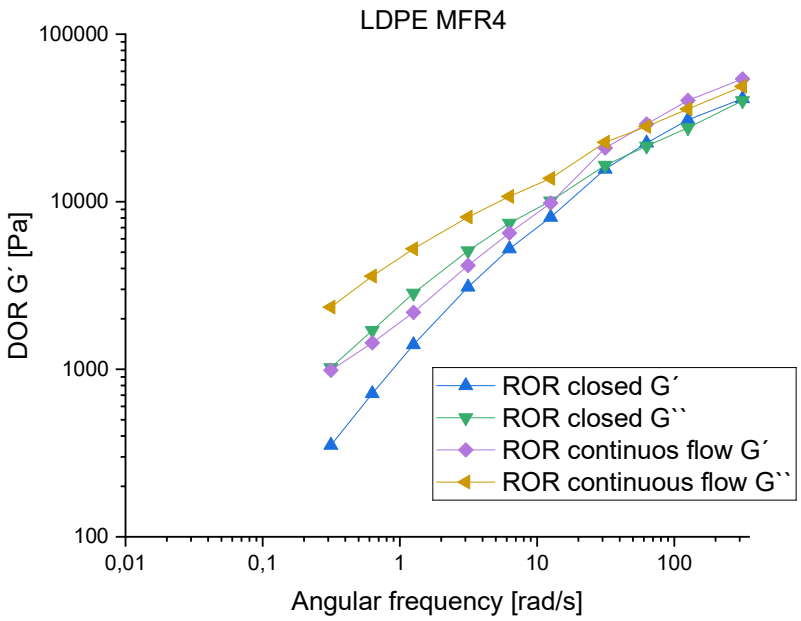
- Feeding by gear pump or extruder
- Inlet valve for continuous purge of the transfer line
- Double cone rotor
- Measurement cell with pressure measurement at in- and outlet
- Exit valve for pressurized measurement of viscosity
- Measurement in oscillation or at constant rotation

ROR-dynamic measurement

Entrance valve is necessary to purge the transfer line

- Change of G´ and G´´ when the test performed in under flow
- An entrance valve to purge the transfer line between the measurements

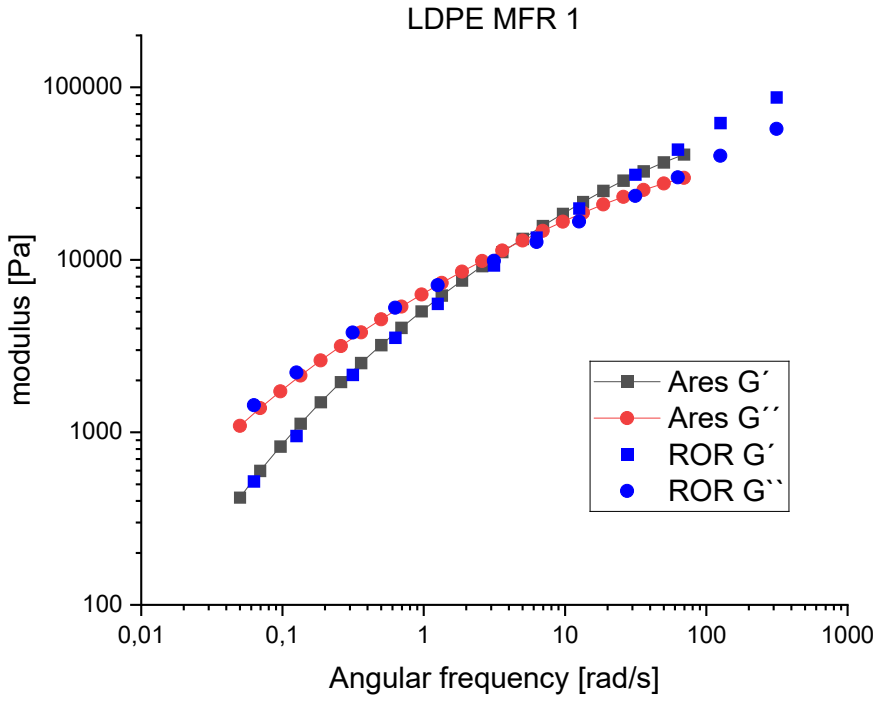




ROR-dynamic measurement

Example Material LDPE MFR 1

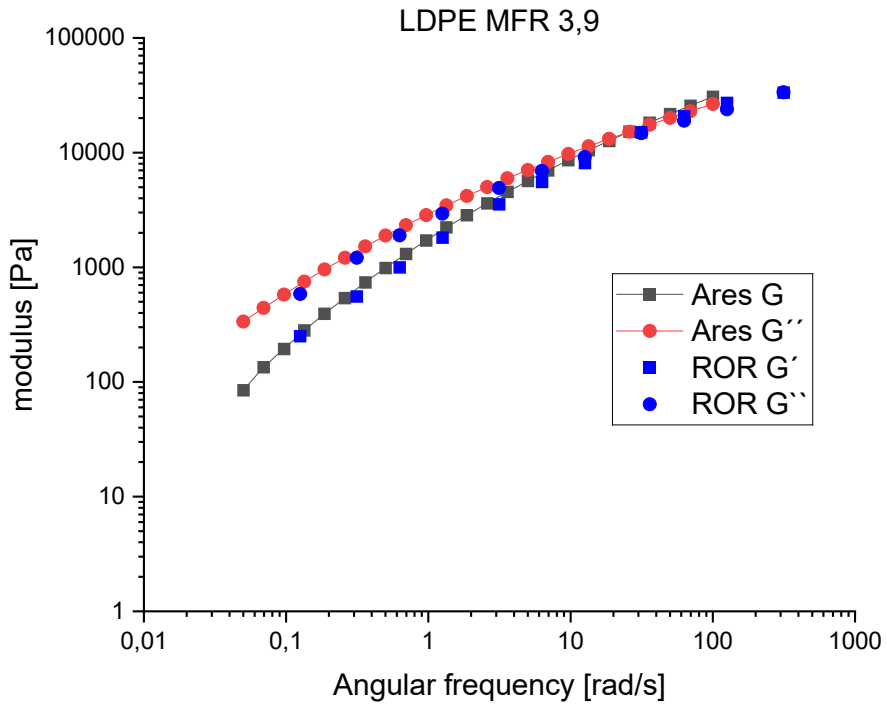
- Excellent agreement of between lab device and ROR for G´; G´´ and cross over point for a high viscous LDPE



ROR-dynamic measurement

Example Material LDPE MFR 3,9

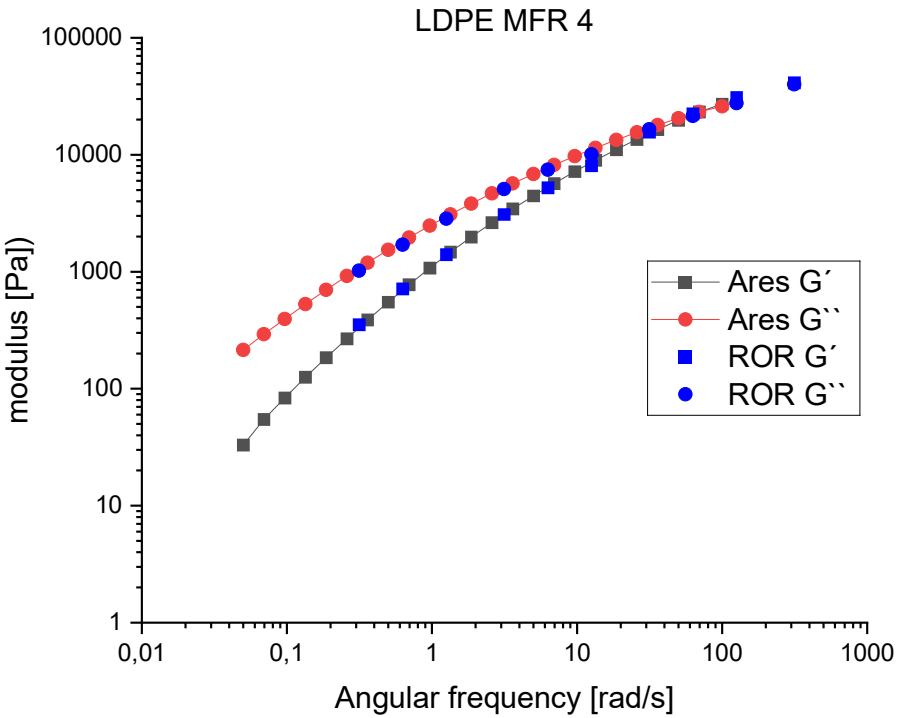
- Good agreement of between lab device and ROR for G´; G´´ and cross over point



ROR-dynamic measurement

Example Material LDPE MFR 4,0

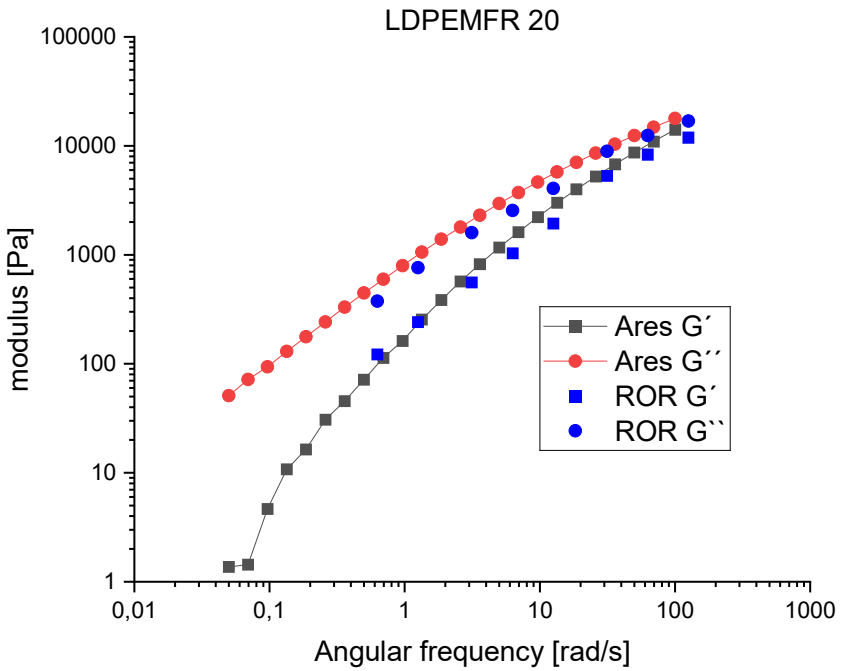
- Excellent agreement of between lab device and ROR for G´; G´´ and cross over point
- Material with similar MFR compared to the previous sample shows different cross over point



ROR-dynamic measurement

Example Material LDPE MFR 20

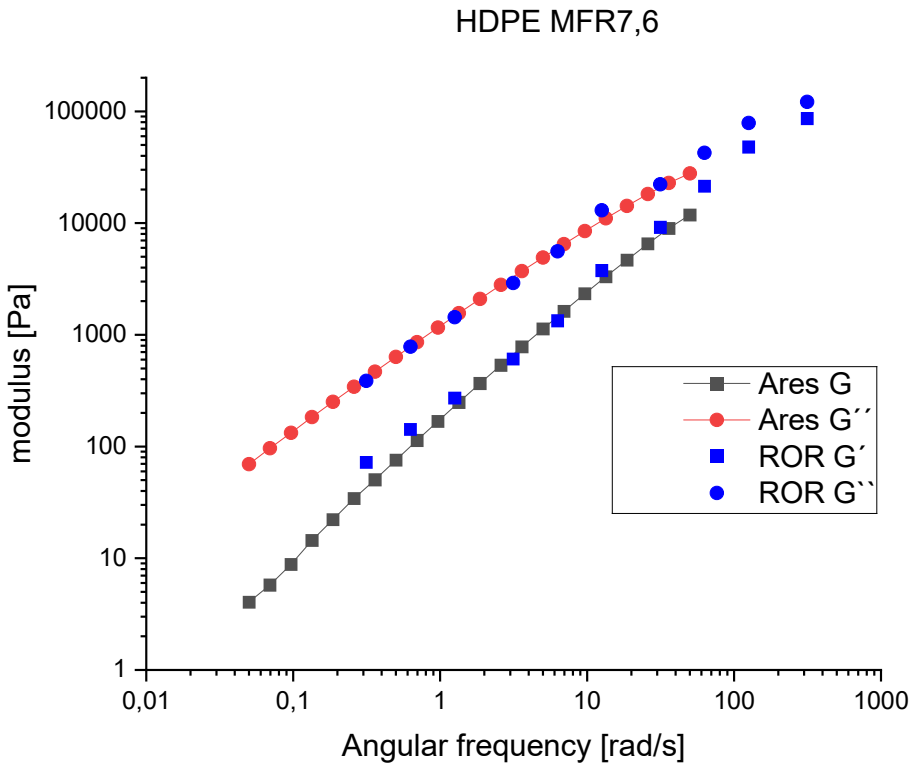
- Good agreement of between lab device and ROR for G´; G´´ and cross over point a the low viscosity LDPE



ROR-dynamic measurement

Example Material HDPE MFR 7,6

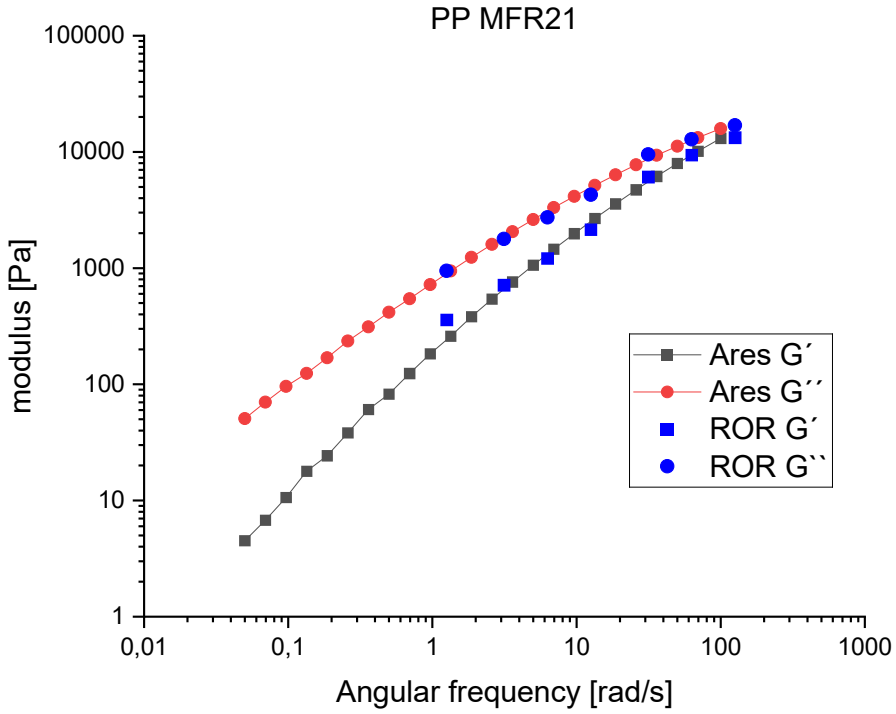
- Excellent agreement of between lab device and ROR for G´; G´´ and cross over point for the low viscosity LDPE



ROR-dynamic measurement

Example Material PP MFR 21

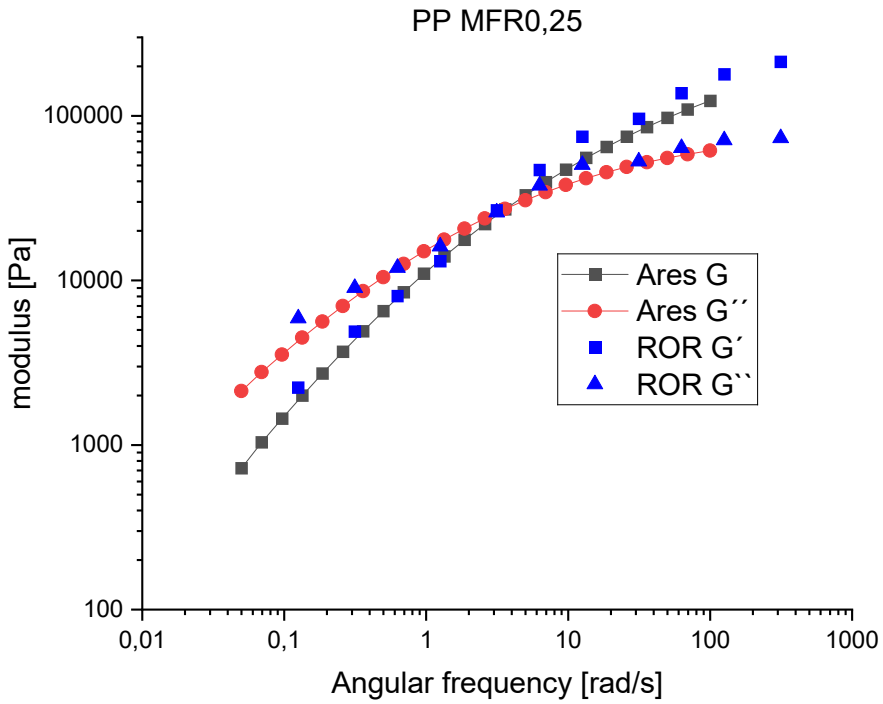
- Excellent agreement of between lab device and ROR for G´; G´´ and cross over point for the low viscosity PP



ROR-dynamic measurement

Example Material PP MFR 0,25

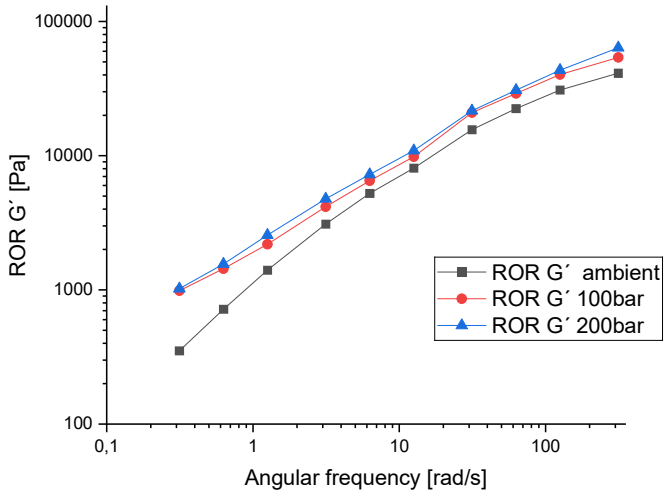
- Excellent agreement of between lab device and ROR for G´; G´´ and cross over point for the high viscosity PP

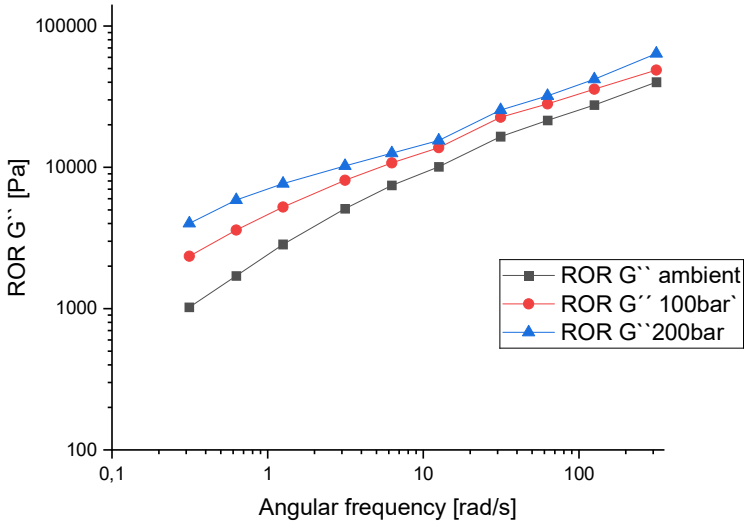


ROR-dynamic measurement

Pressure dependency of modulus

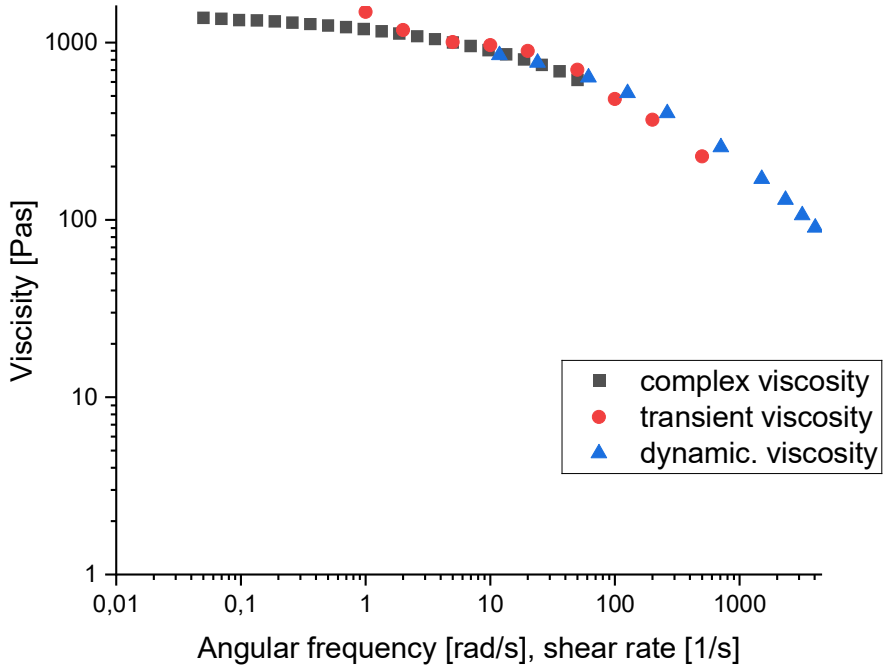
- Closing the exit valve pressure can be adjusted using the feeding extruder or gear pump
- No other rotational rheometer can measure under pressure
- A strong change of modulus by pressure is to be seen





ROR-transient measurement

Measurement of transient viscosity – prove of Cox-Mertz



Complex viscosity: cone plate rheometer

Transient viscosity: ROR

Dynamic viscosity: capillary rheometer RG75

The data coincide well and show the validity of Cox-Mertz rule for this material

ROR-Rotational

Conclusions

- The new ROR is an industrial prove Rheometer with oscillating and transient operation
- Feeding of the device is done by a small extruder or gear pump
- A bypass allows a continuous feed of the transfer line
- A very nice agreement between ROR data and Ares cone plate data is given for dynamic and transient data
- ROR is needed to visco-elastic data during polymer processing

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