Multi-Pass Rheometer (MPR)
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In conjunction with University of Cambridge, Strata has designed and commercialised the Multi-Pass Rheometer technology for investigating the rheological behaviour of fluids and solids under operating conditions.

Design

The Cambridge Multi-Pass Rheometer (MPR) is a novel dual-piston capillary rheometer consisting of two servo-hydraulically controlled pistons enclosed within temperature-controlled barrels and a central test section. The pistons can be moved back and forth to drive the material contained within the MPR through the test section for precise repeatable measurements on a single sample.

Applications

- Investigate the rheological behaviour of melts, liquids and soft solids
- Precise processing studies of complex fluids in complex flows
- Corroborating computational fluid dynamic models
- Establish shear-ageing characteristics

Key Features

- Wide range of testing on a single sample without the inconvenience of having to load a fresh sample each time
- Sample size can be as small as 10g
- Samples can be pre-compressed, allowing tests to be conducted at high, mean or minimum pressures
- High wall shear rates
- Precise digital control
- In normal operation the displacement of the pistons is varied and the resulting pressure change is measured. However, with the latest control software it is possible to set the pressure and measure the resulting displacement variation
Optional Optical Module

- Allows the flow of the material within the test section to be observed concurrently with rheological measurements
- Such modules have been extensively used to carry out flow birefringence studies of polymer melts

A variety of test sections are available with the MPR, from capillaries for determining simple rheological parameters to cross flows used in conjunction with the optical module to allow flow visualisation studies to be carried out. Any type of channel can be made for the MPR within the limits of manufacturing capability.

Optional X-Ray Module

Optional X-Ray Module, using a 50kV Copper source, allows for SAXS (small angle x-ray) and WAXS (wide angle x-ray) images to be captured concurrently with rheological measurements.

This can be used to look at the sample structure at a molecular level. To the right is an example result. The data can then be analysed using the software supplied, to give the result of intensity vs azimuthal angle, as illustrated below.
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Operating Conditions

Operating temperature range -20 to 200°C
Wall shear rates of up to 160,000 s\(^{-1}\)
Operating pressure to 200 barG
Variable piston velocity up to 200 mm s\(^{-1}\)

Interested? Call +44 (0)1932 732 340 or email enquiries@stratatec.co.uk