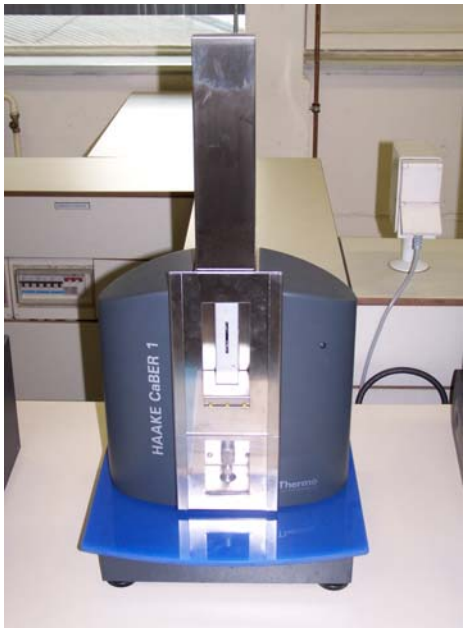
CApillary Breakup Extensional Rheometer (CABER, Thermo Haake)

The CaBER rheometer provides valuable information about the material's extensional properties that rotational rheometers simply cannot provide. That's because materials that behave similarly in a shearing flow often behave very differently in an extensional flow. With the CaBER instrument, stringiness, filament breakup-time and extensional viscosity can now be quantified to quickly optimize your fluid formulations for either industrial or research applications.



Importance

Extensional flows are common in most industrial processes but the fluids involved are often poorly understood or poorly characterized in extension. From the filling of shampoo bottles to the manufacture of artificial fibers and the coating of rollers in the printing industry, there is invariably an extensional kinematic component in industrial processes. Extensional kinematics always arise in freee surface flows (e.g. in jets, fibers and sheet drawing processes), or if there is a squeezing mechanism or streamline acceleration. Since polymer solutions, melts and suspensions can have markedly different shear and extensional behaviours, the unawareness of extensional data can lead to highly misleading parameter values.

Principle

The CABER uses a laser micrometer to monitor the diameter of a thinning filament. The diameter versus time data is the raw output of the instrument and will serve a the appropriate input for a software package that will determine the rheological parameters. Available models can be either fitted to extract rheological parameters or diameter versus time data can be converted to an apparent extensional viscosity where the strain is defined by the diameter of the filament and hence varies with time. Other qualitative information that can be obtained from these data are time-to-breakup and from the shape of the curve the 'stringiness' of the fluid.

Specifications

The measurement temperature can be controlled by using a standard thermostat bath. The shear viscosity range that can be used in this instrument is between 10 and 10^6 mPa.s. The Hencky strain that can be achieved goes up to 10 whereas the imposed strain rates vary between 10^{-5} and 10 s^{-1}. The diameter resolution that can be measured accurately by the laser monitor is 8 micron.