



## **Rheology Solutions**

*Rheology Solutions is the sole Australian distributor of this product range and we welcome the opportunity of discussing your application requirements.*

*We hope the information you are seeking is contained within this file.  
If you have any questions, or require further information please contact us.  
We look forward to being of further service.*

*Regards from the Team at Rheology Solutions.*

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# RheoAdaptive Control



## Key-words

- RheoAdaptive Controlled Rate (CR) control loop
- Yield Stress Determination
- HAAKE MARS
- HAAKE RheoStress 6000

## Instrument

- HAAKE MARS
- UTC Peltier
- C35/1°Ti

## Sample

- Viscoelastic sample (cosmetic cream)

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## Yield stress determination on fragile structures

Yield stress is a very important parameter in relation to the sensory properties of food products (mouth-feel), the application behaviour of cosmetic products, the sagging of paints, etc.

Different methods for the determination of the yield stress of a sample exist. A commonly used method is measuring the deformation while applying a continuously increasing shear stress in Controlled Stress (CS) mode (see fig. 1.).

The yield stress is the stress value above which the deformation shows a much more rapid increase than at lower torques, see the sharp bend in the curve in fig. 2.

In Controlled Rate (CR) mode the yield stress is measured determining the initial maximum of the measured shear stress curve. In order to get a reliable and reproducible yield stress value which is independent of the applied shear rate, the shear rate has to be very low and at the same time, really constant from the start of the measurement.

Combining these two requirements is a very demanding task for the rotational speed control loop of a universal rheometer. With the new RheoAdaptive control loop response times in the order of 10 to 20 ms can be achieved for rotational speeds down to  $10^{-5}$  rad/s and response times in the order of 1 s for rotational speeds down to  $10^{-7}$  rad/s can be realized.

## Reliable yield stresses in CR Mode

The graph below shows that the yield stress of a cosmetic cream measured in CS-mode also can be measured in CR-mode when a low enough constant shear rate is applied and set value is attained fast enough. The yield point, defined by the maximum in the curve, measured at an angular speed of  $10^{-6}$  rad/s is identical to the value measured in CS-mode.

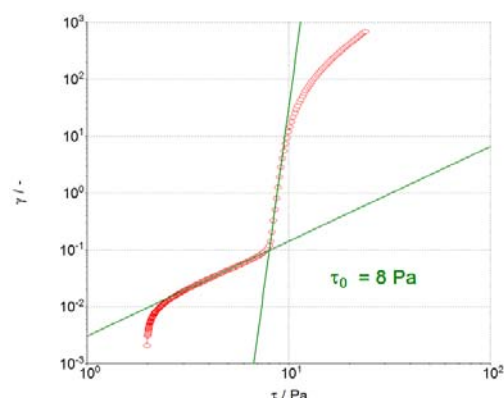


Fig. 1 Typical measuring curve of a yield stress determination in CS mode

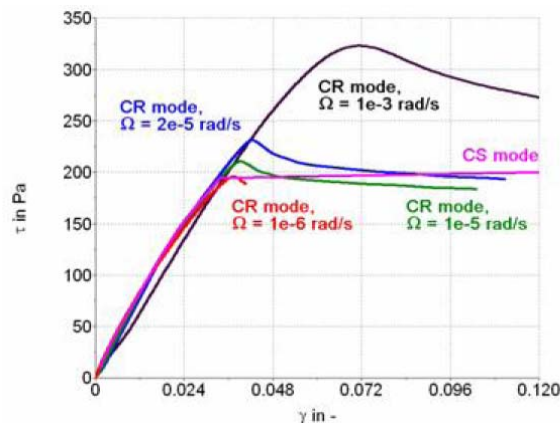


Fig. 2 Yield Stress determination for a cosmetic cream in CR mode at different angular velocities