

Single fibre testing – relation to variability

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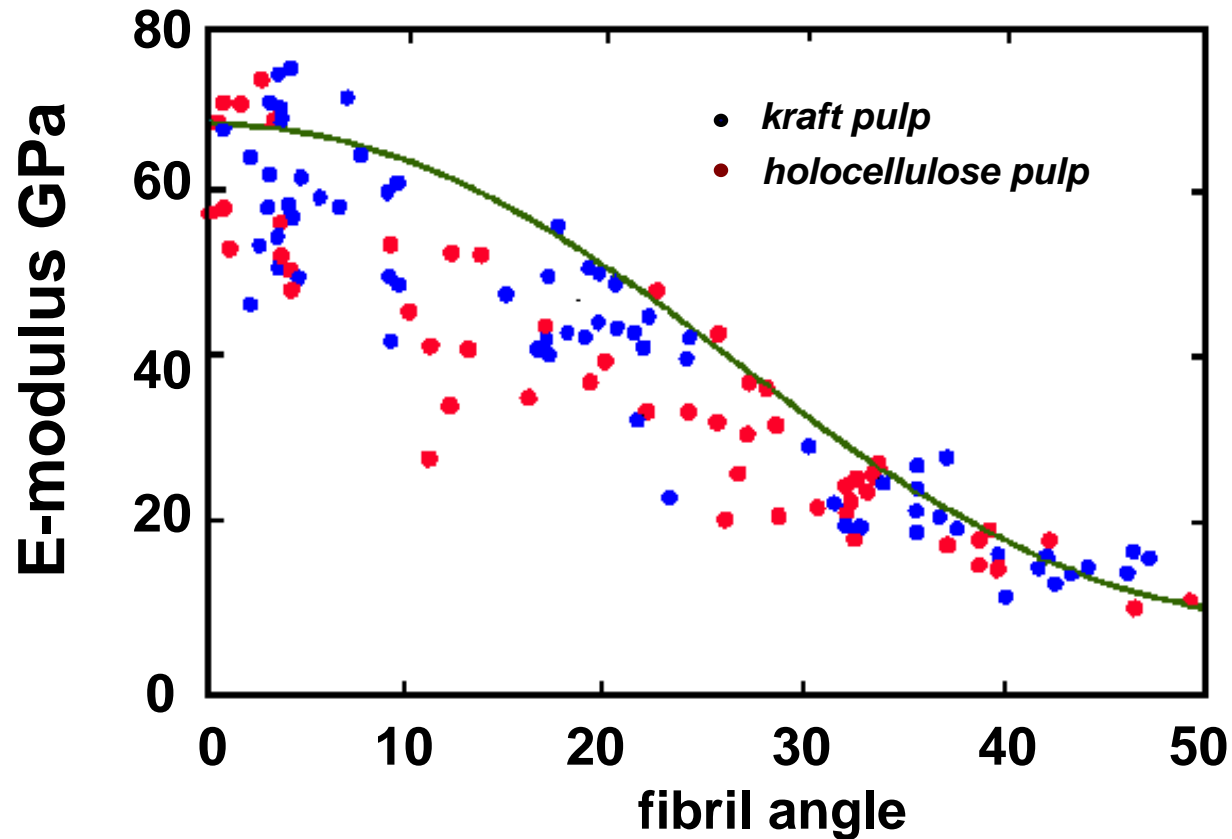


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Single fibre testing – why?

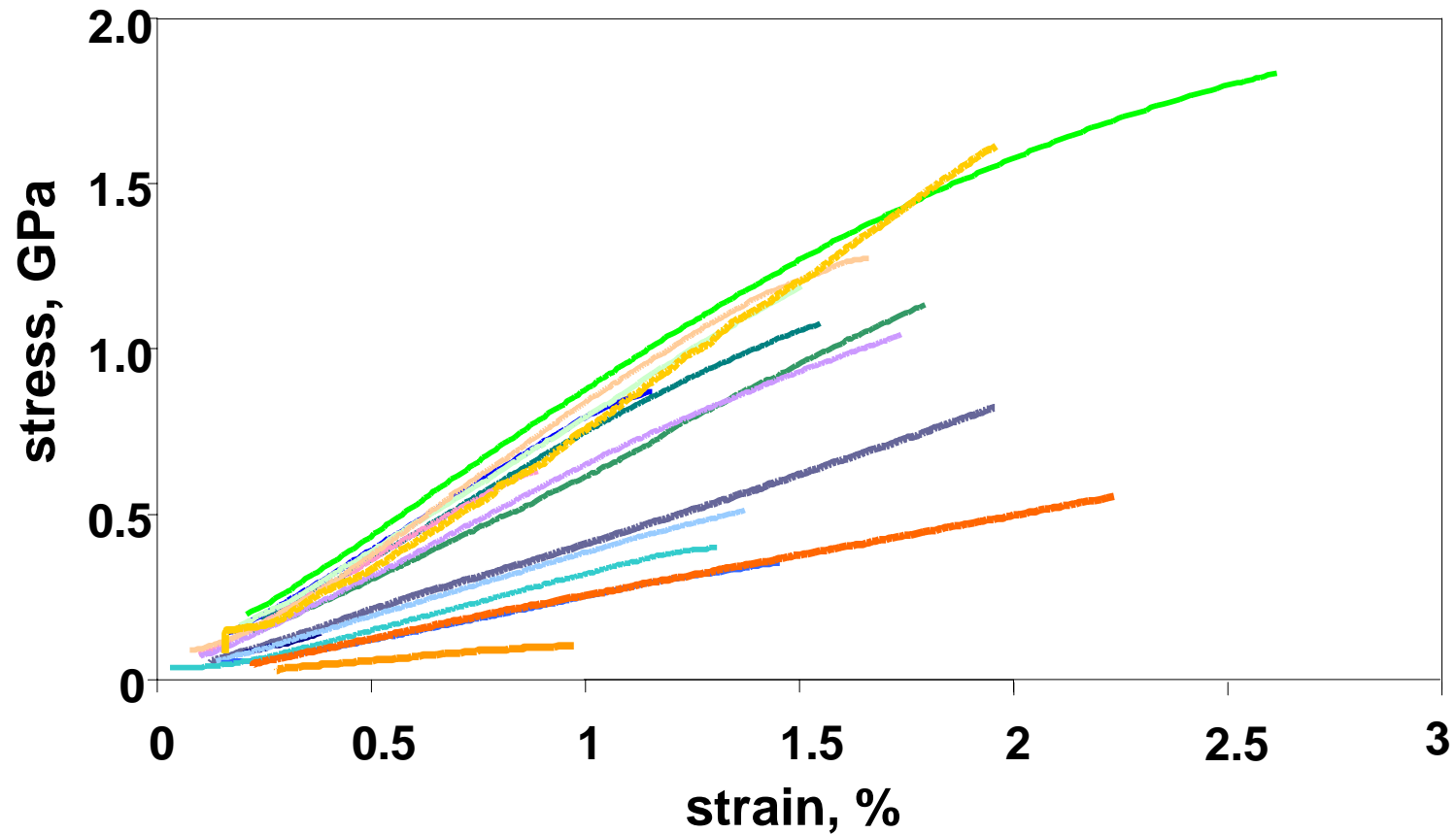
- *Difficult testing method*
- *Variability*
- *Characterisation difficult*
- *Artefacts in testing*

Fibre E-modulus – fibril angle



Page, El-Hosseiny, Winkler,
Lancaster. Tappi 1977

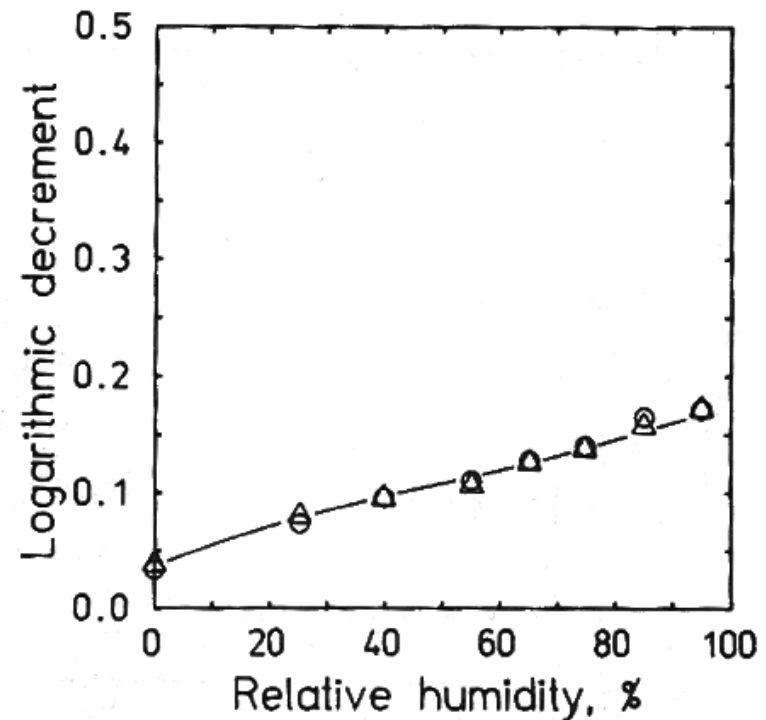
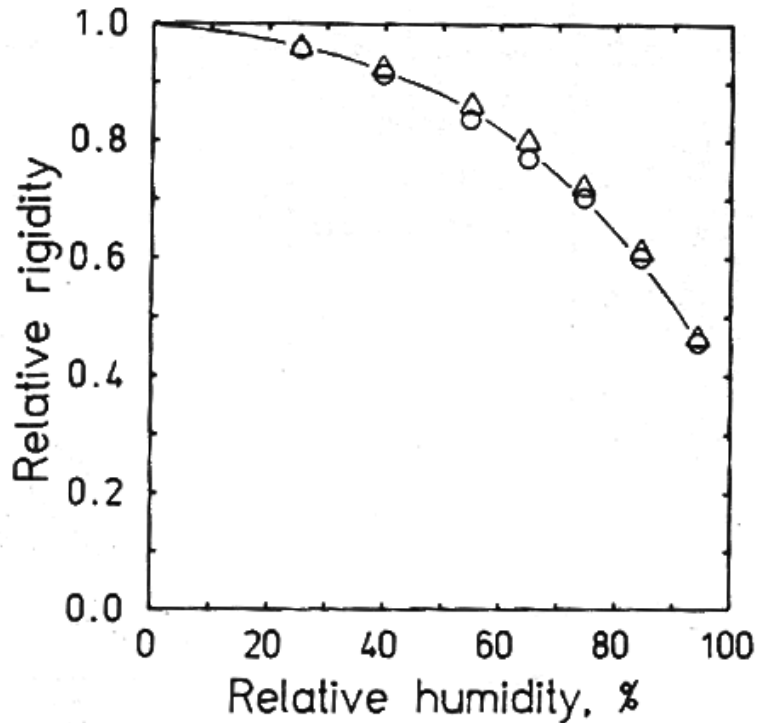
Tensile testing of holocellulose fibres



How to overcome the difficulties

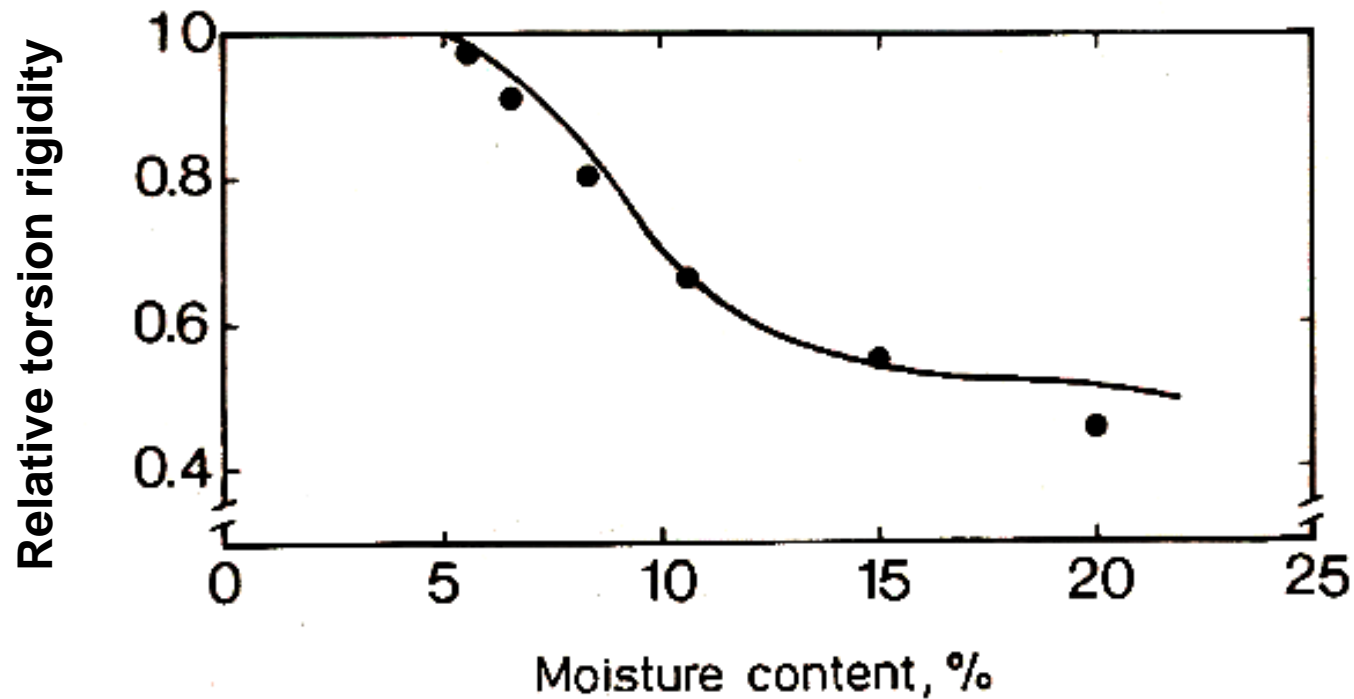
- *Relative properties*
 - *look at effects of variables*
- *Modelling*

Torsion rigidity – kraft fibres



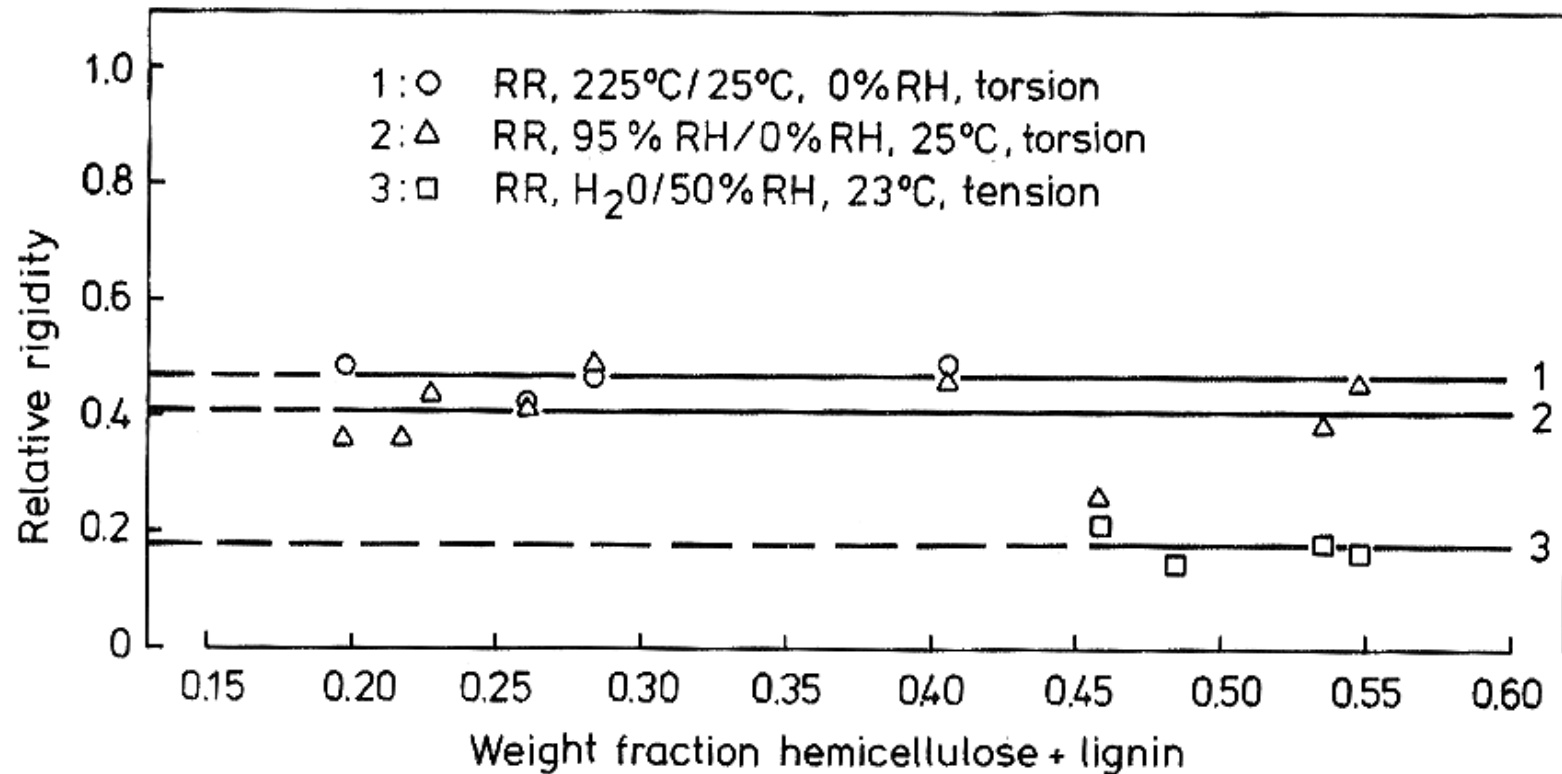
Kolseth, Ehrnrooth. 1986

Torsion rigidity - modelling



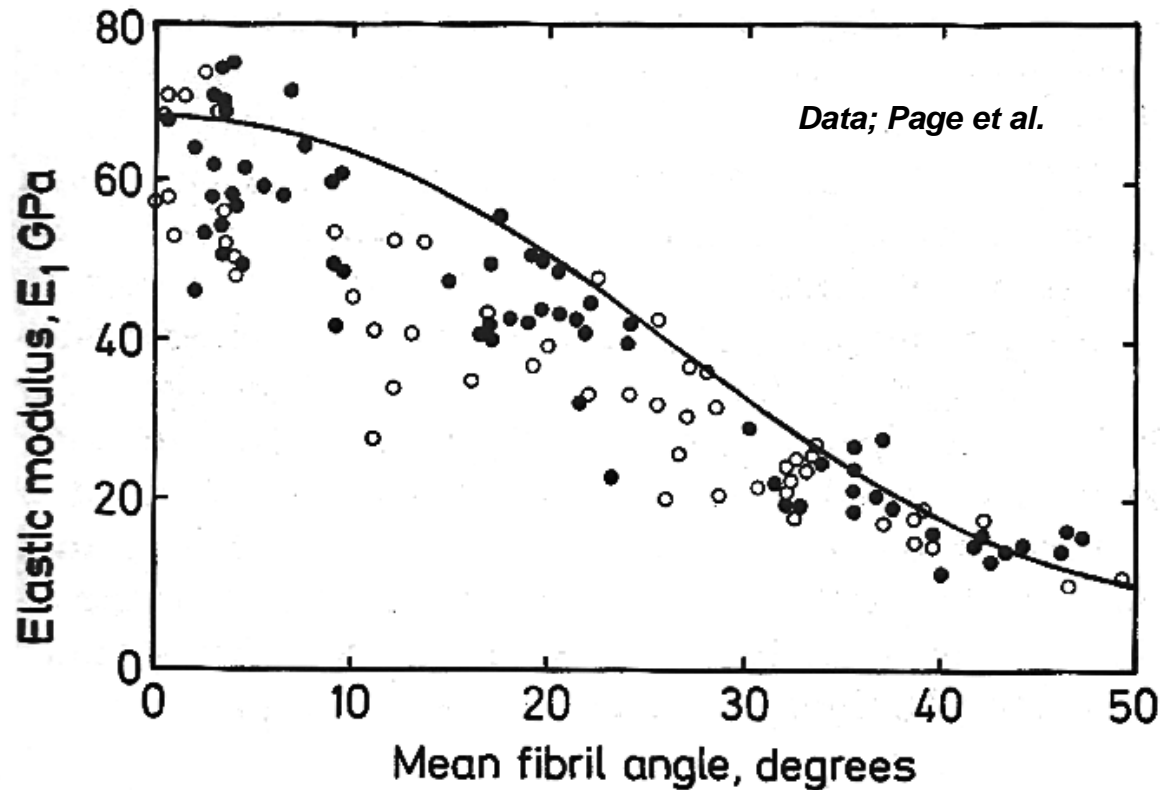
Salmén, Kolseth, de Ruvo,
J. Pulp Pap. Sci. 1985

Modelling softening effects



Kolseth, Ehrnrooth. 1986

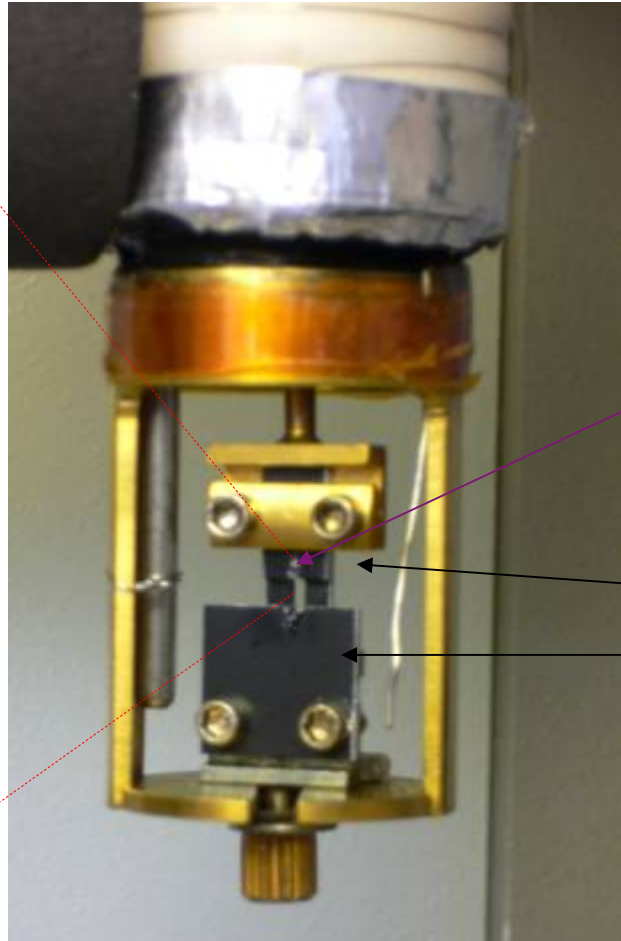
Modelling effects of fibril angle



*Model based on
wood polymer
constituent
properties*

Salmén. 1986

Fibre creep testing

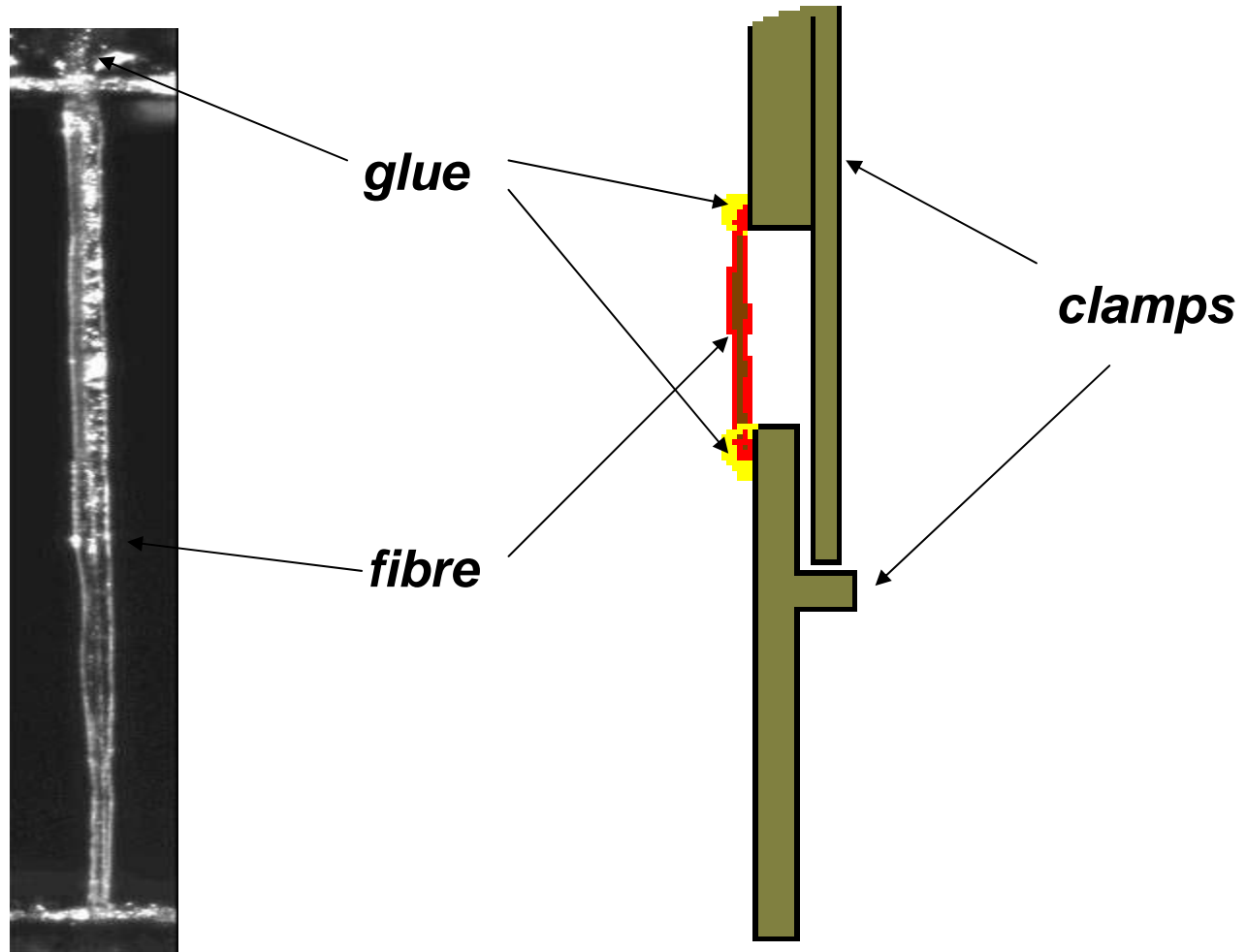


fibre

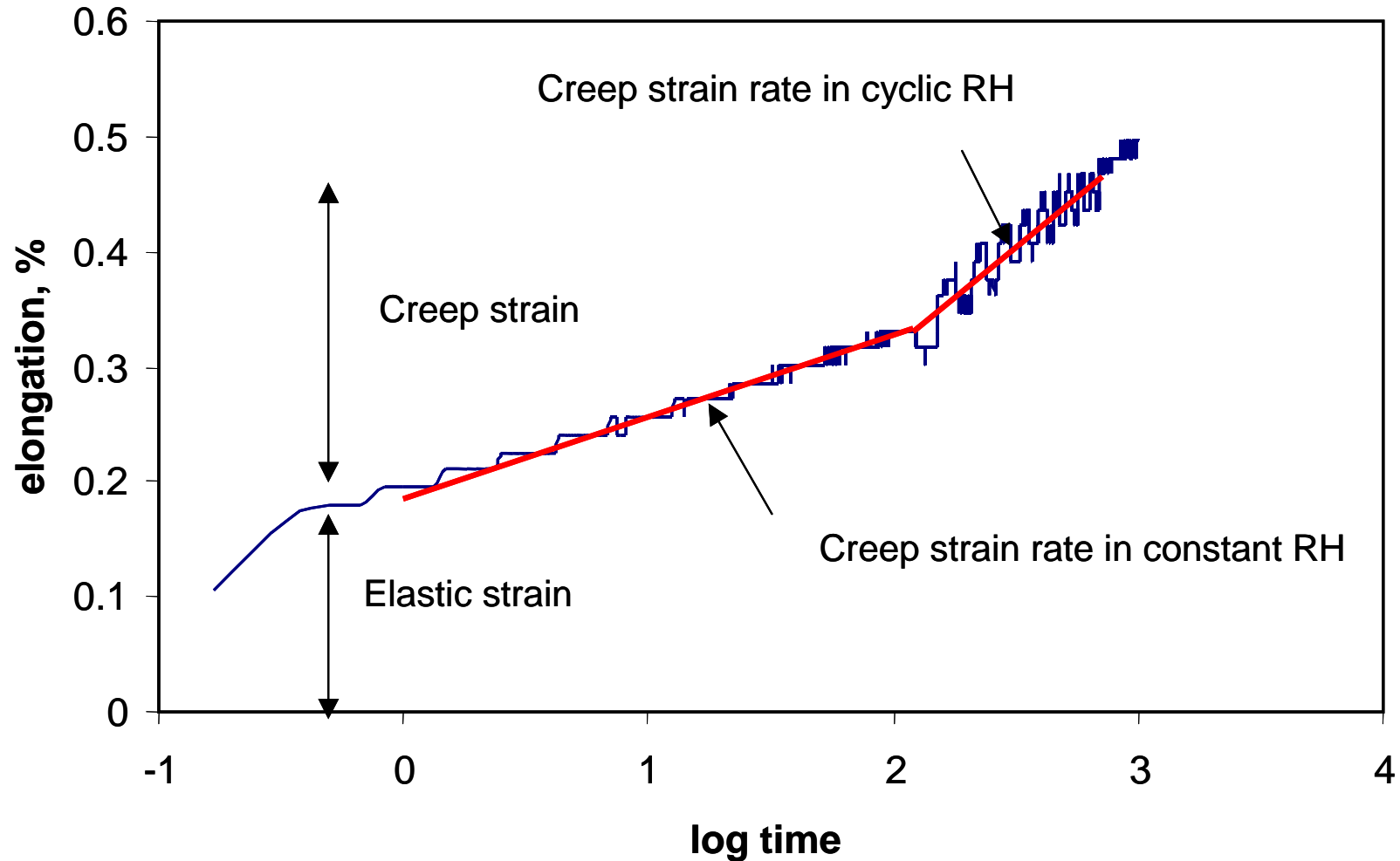
upper

lower clamp

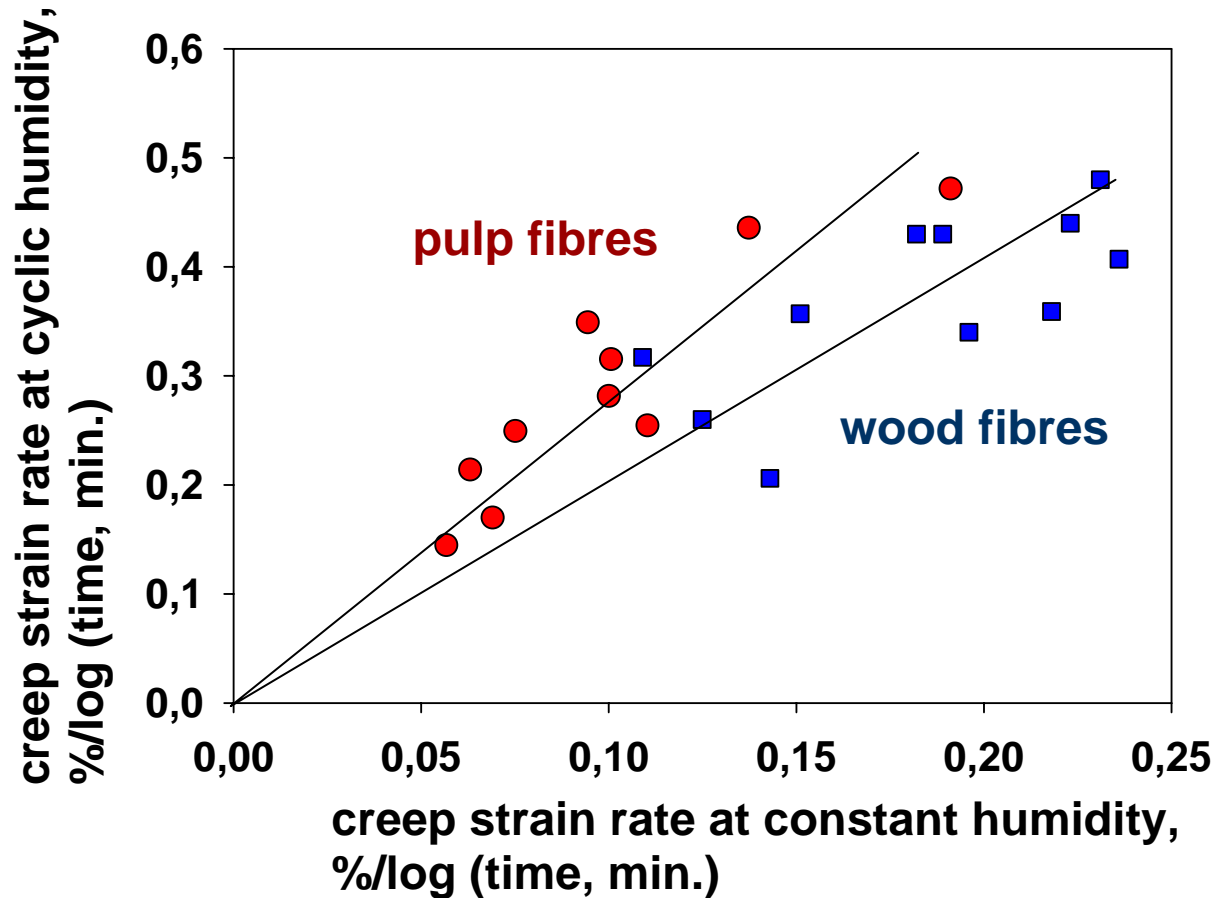
Fibre mounted between clamps



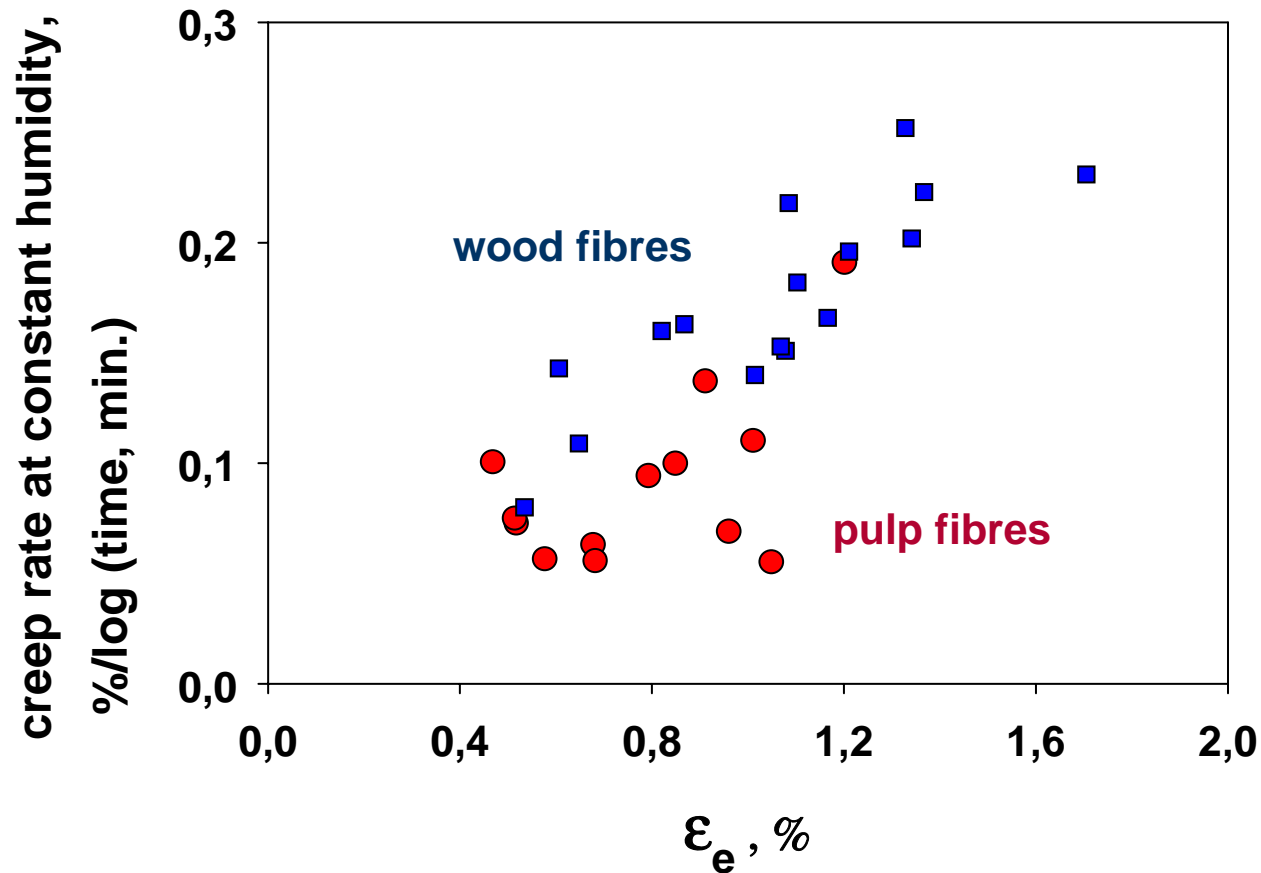
Creep testing



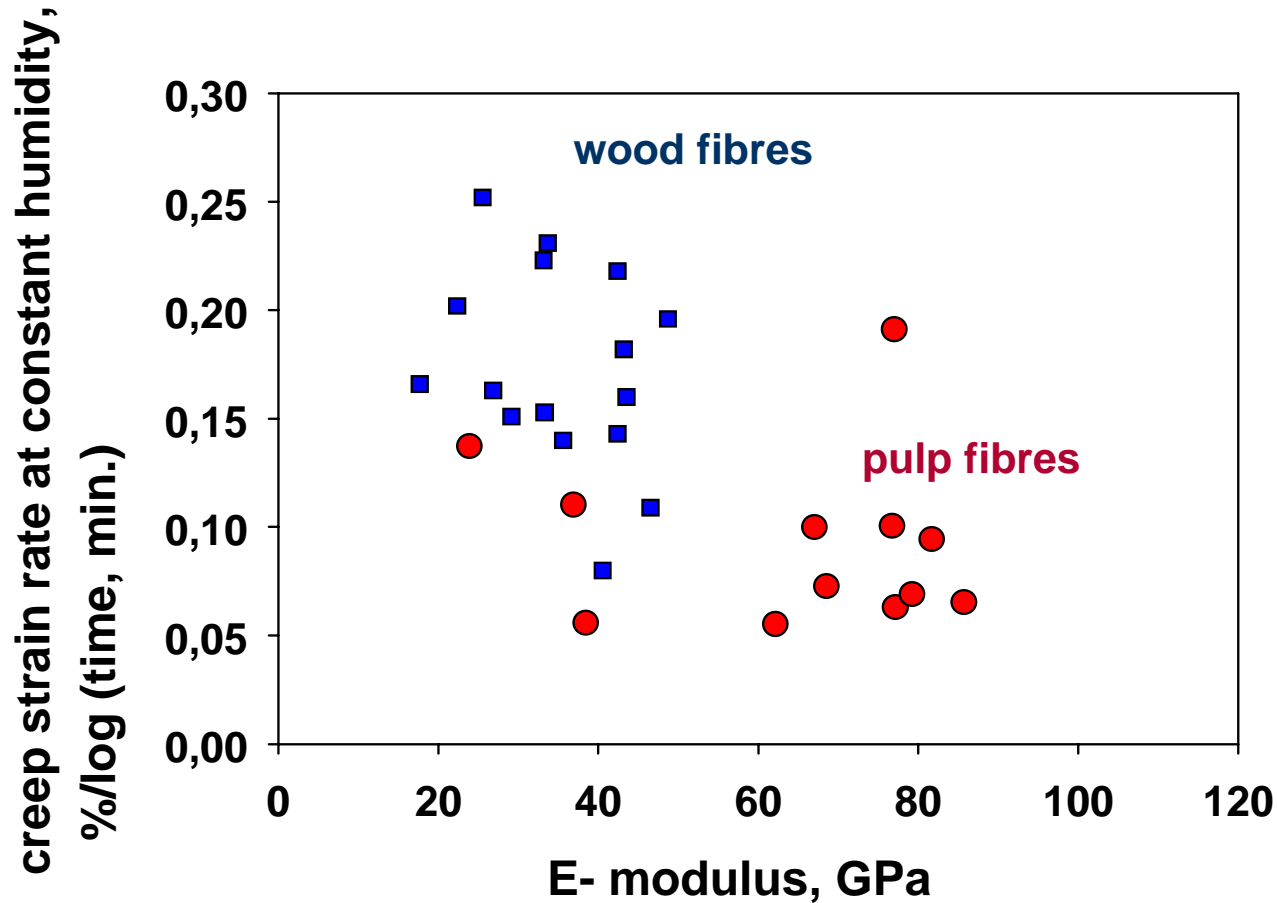
Creep strain rates – cyclic versus constant



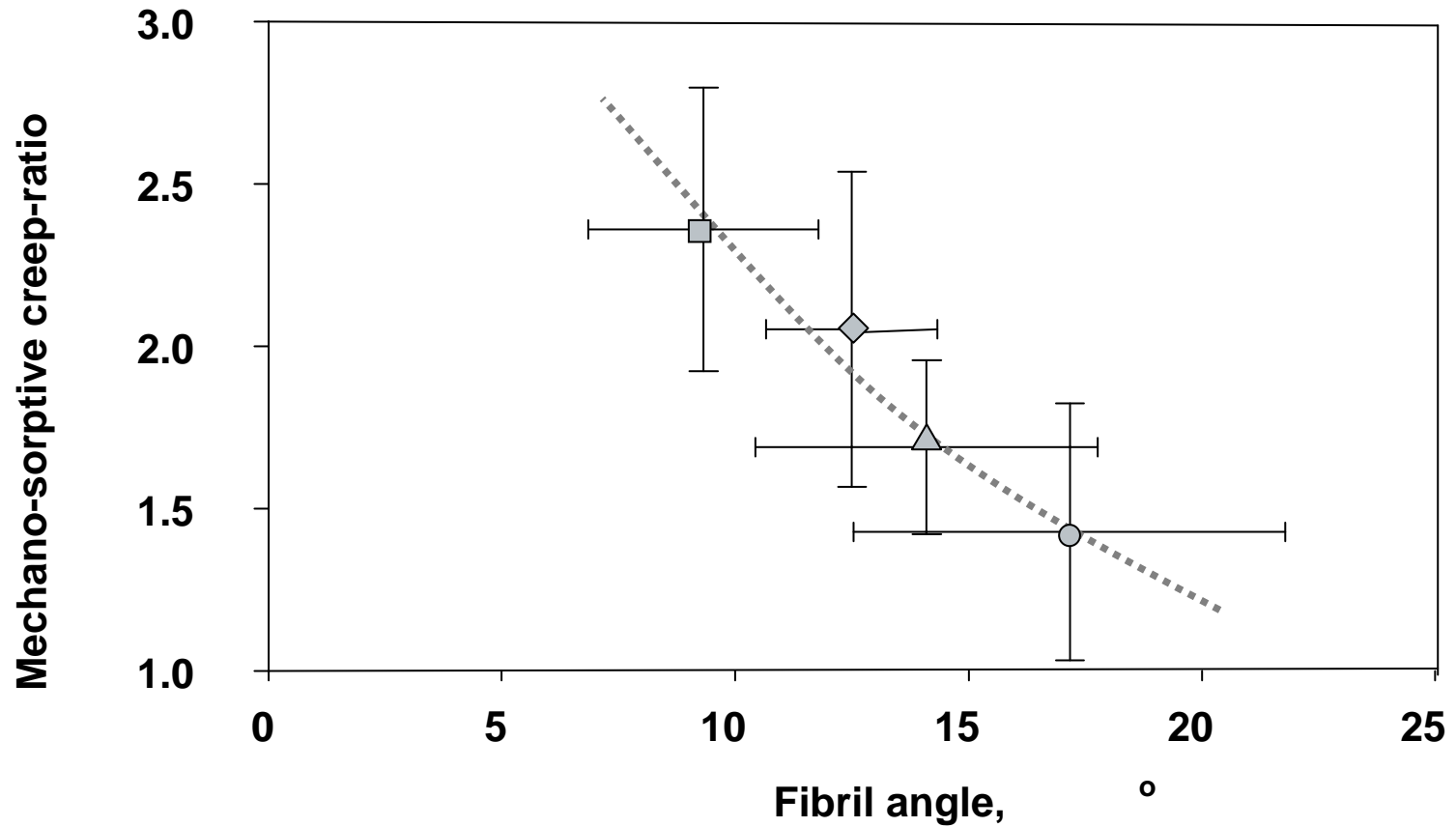
Creep at constant humidity versus strain



Creep strain rate versus E-modulus



Effect of fibril angle



Conclusions

- *Fibre testing may give valuable information*
- *Measurements should be given in relative terms*
- *Well characterised samples for comparisons*