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Measurements and calculations on yield surfaces in tension–simple shear experiments

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- Comparison experiments / simulations
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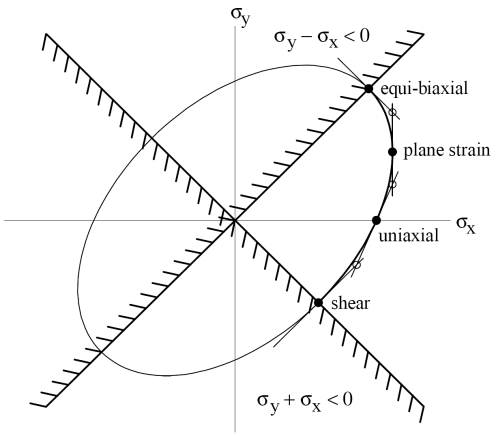
The Vegter yield criterion



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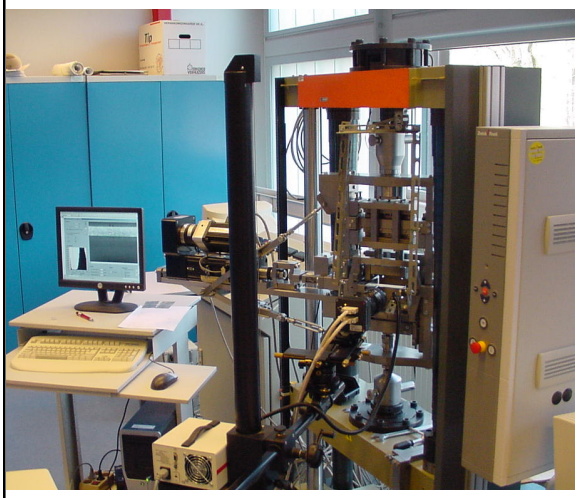
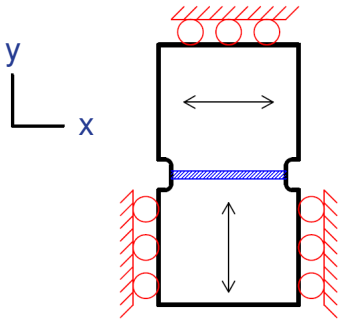
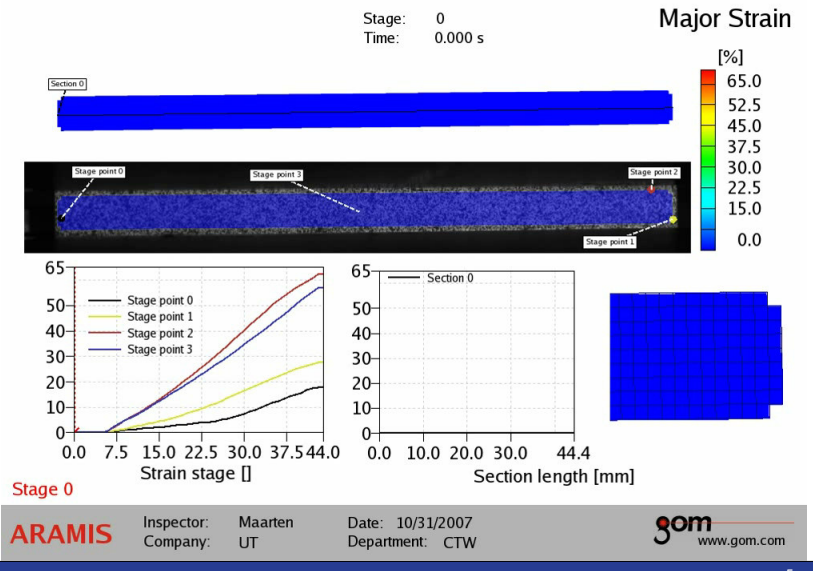
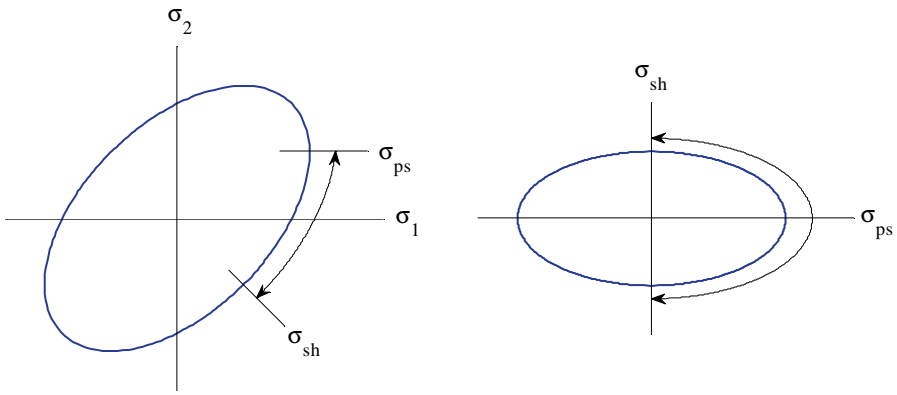
Biaxial test equipment







Domain in stress space



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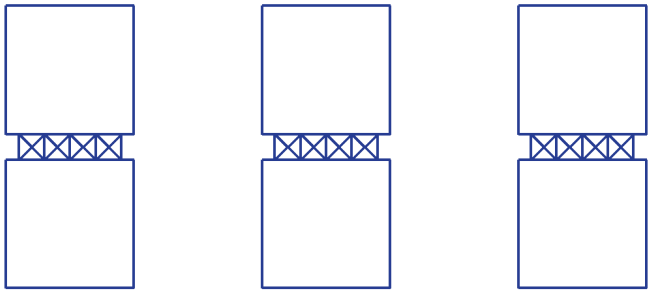
Possible deformation modes

Tension | Simple shear | Non-proportional



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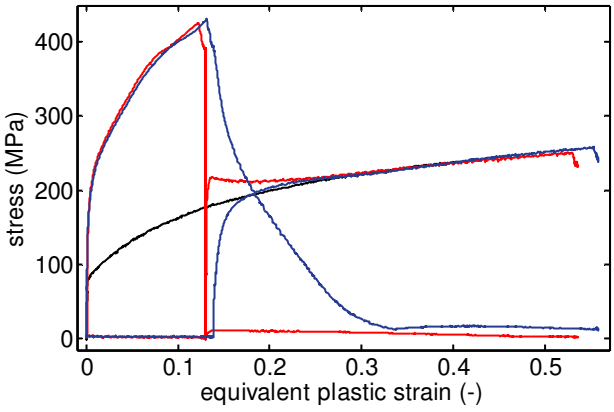
Strain path changes applied to mild steel



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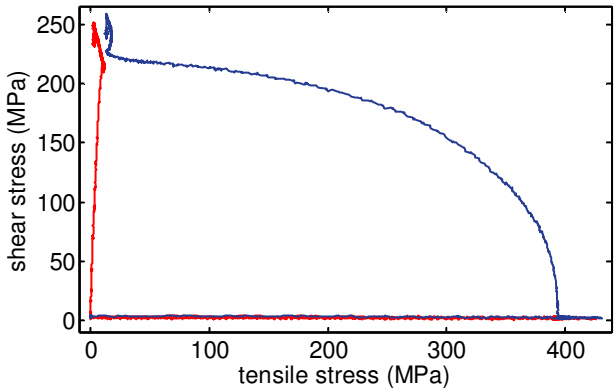
Stress paths



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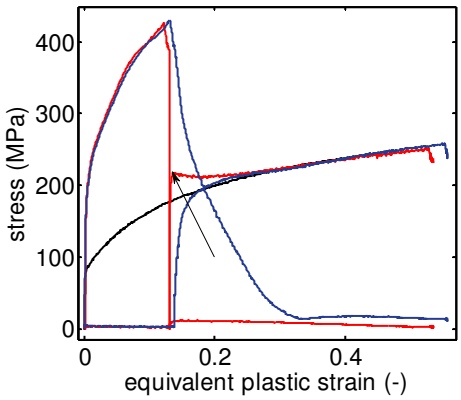
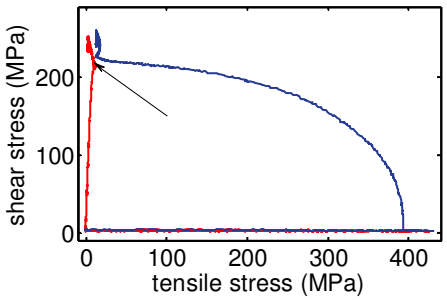
Yield surface correspondence





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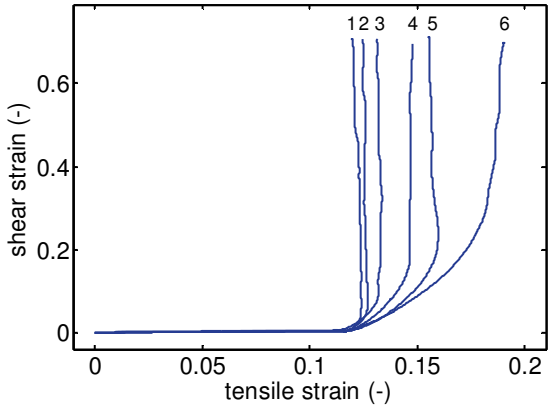
Different strain paths



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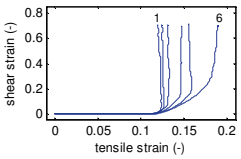
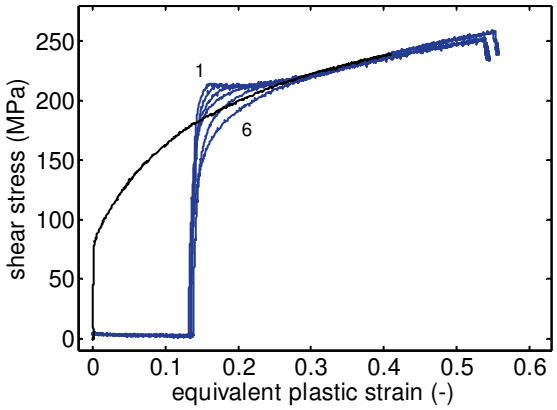
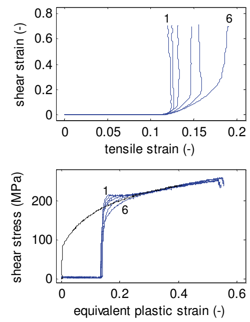
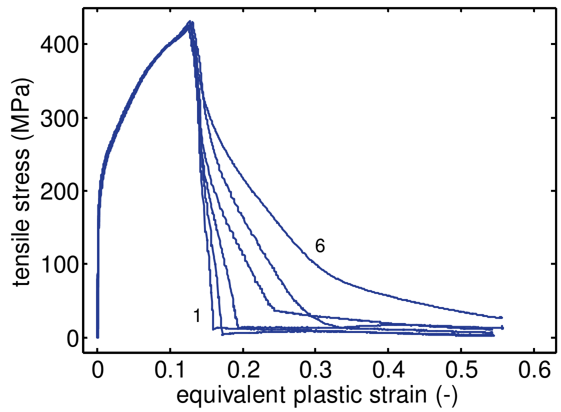
Shear stresses



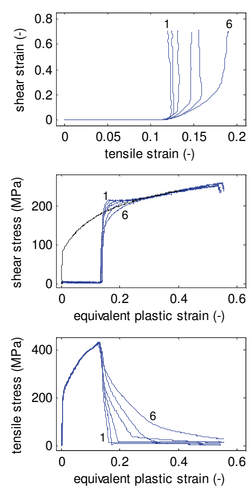


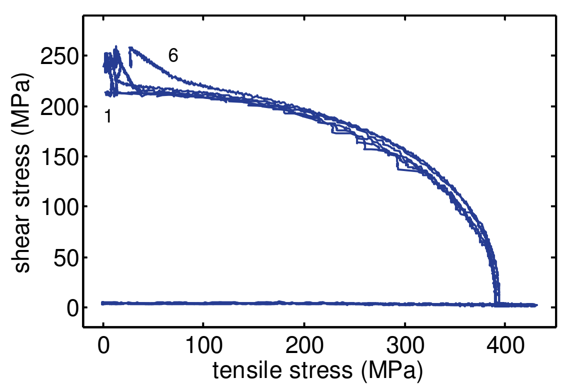
Tensile stresses





Stress paths





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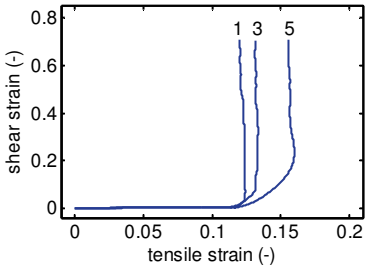
Simulation of experiments



Material model:

Vegter yield criterion

Isotropic hardening (tabular)

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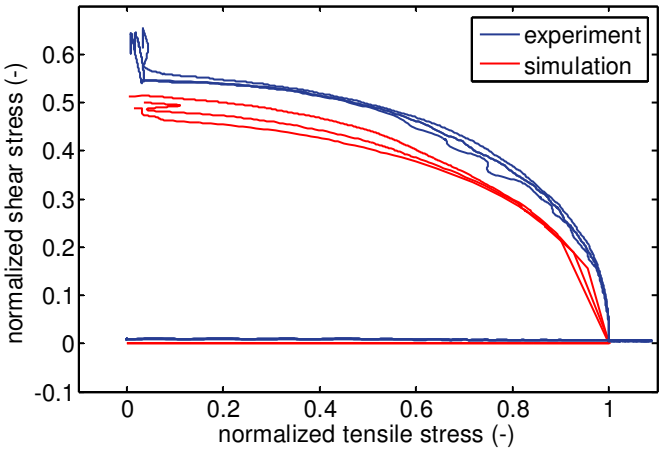
Results in stress space for mild steel



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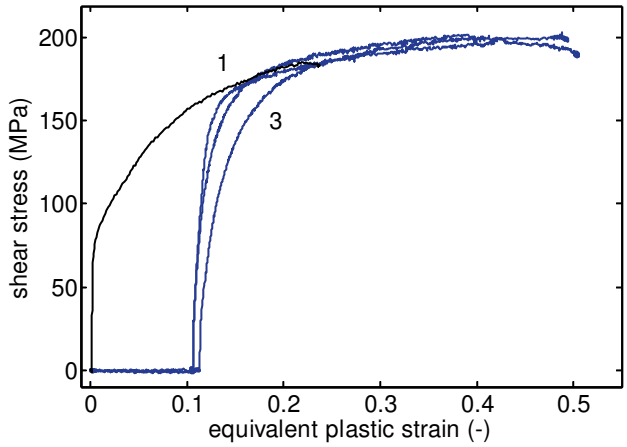
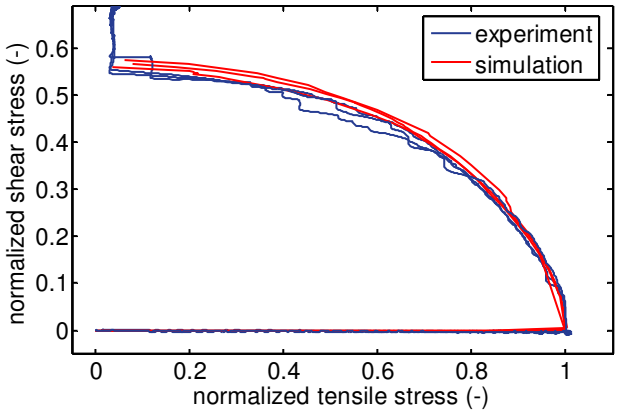
Orthogonal experiments for aluminium



Results in stress space for aluminium



Conclusion

- The orthogonal strain path can be used to trace the (current) yield surface
- Influence of strain rate should be corrected
- For DC06 steel the yield locus is distorted by strain
- Aluminium 5182 can be modelled with isotropic hardening

Acknowledgement

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