

Method to determine full work of fracture from disk shaped compact tension tests on hot-mix asphalt

Prepared for SATC 2010

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Introduction and presentation structure

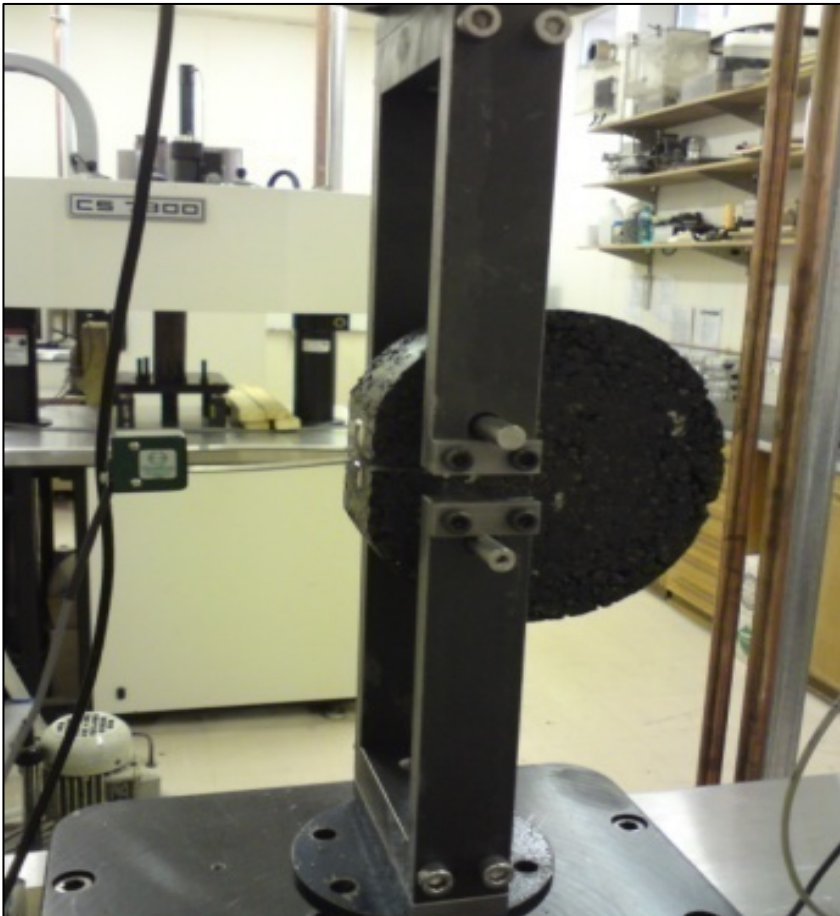
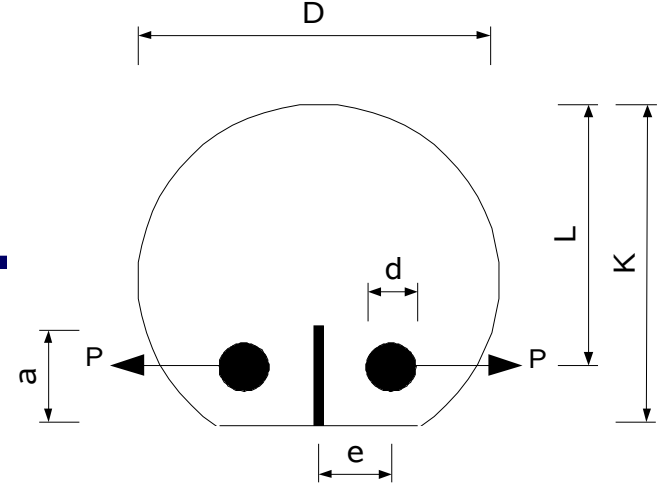
- Objective:
 - Assess suitability of DSCTT for use in the SANRAL project to revise the SAPDM
- What is DSCTT?
- Why DSCTT?
- Method to calculate full work of fracture,
- Simulation of fracture in DSCTT
- Conclusions

What is DSCTT???

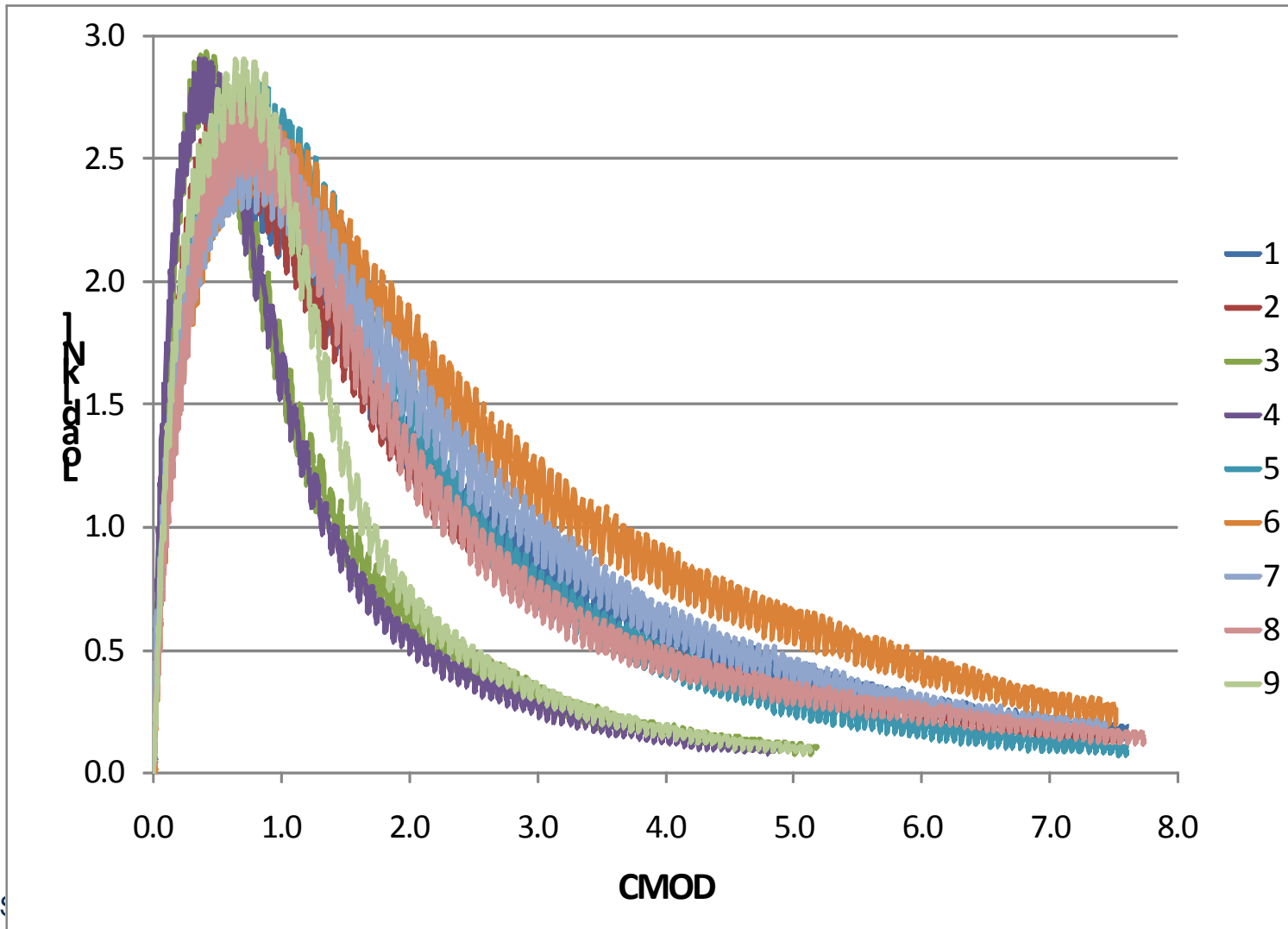


What is DSCCTT ???

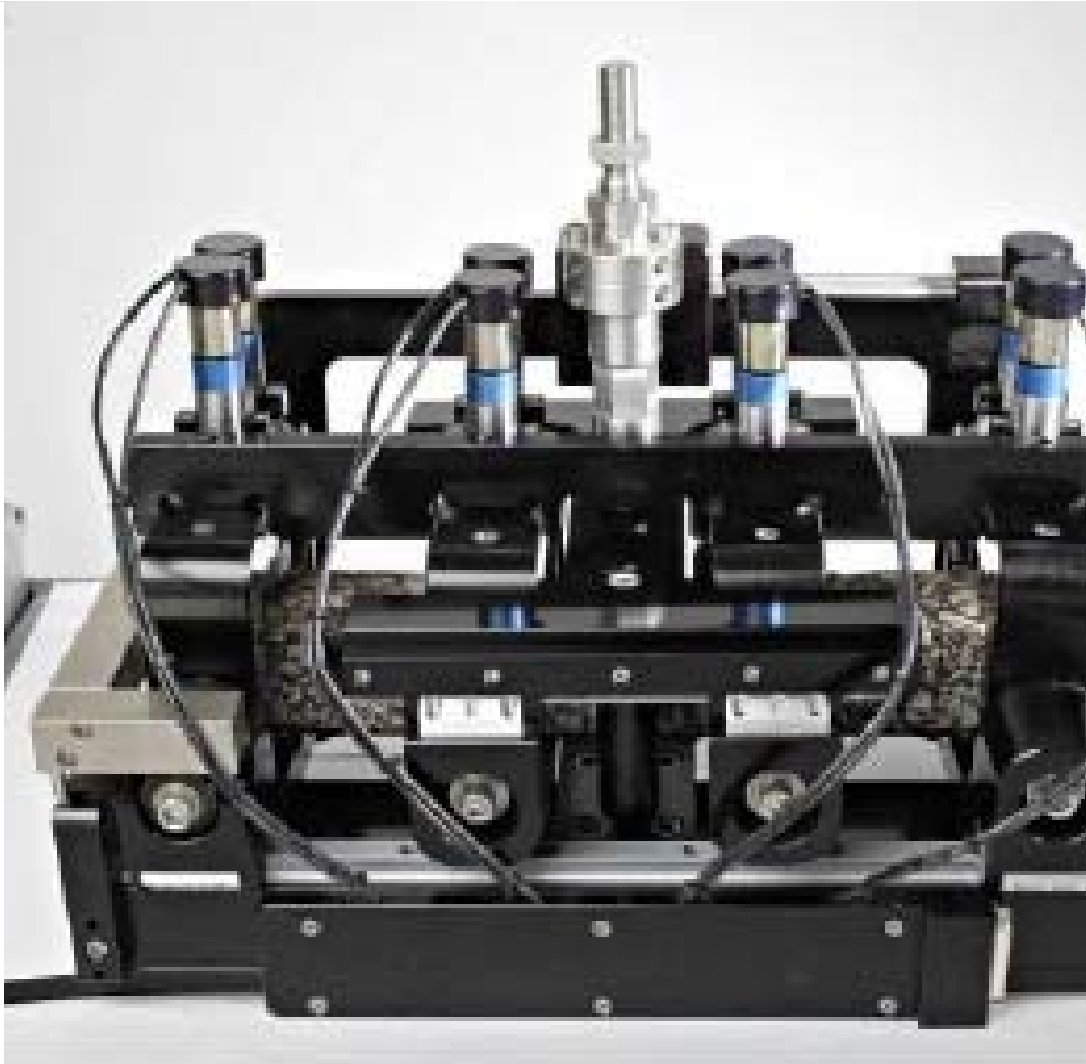
- ASTM D7313-07a



What is DSCTT ???



Why DSCTT ???



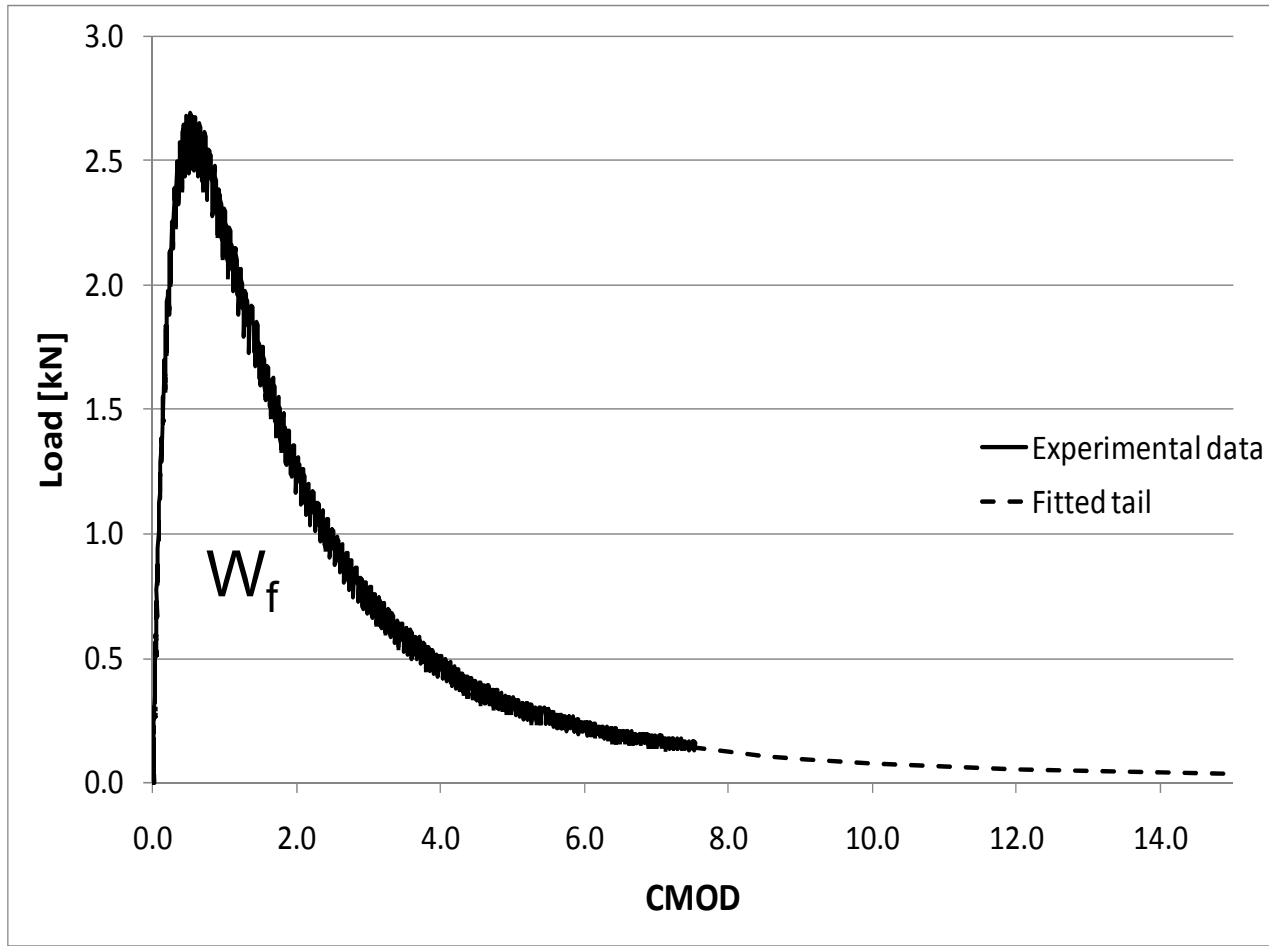
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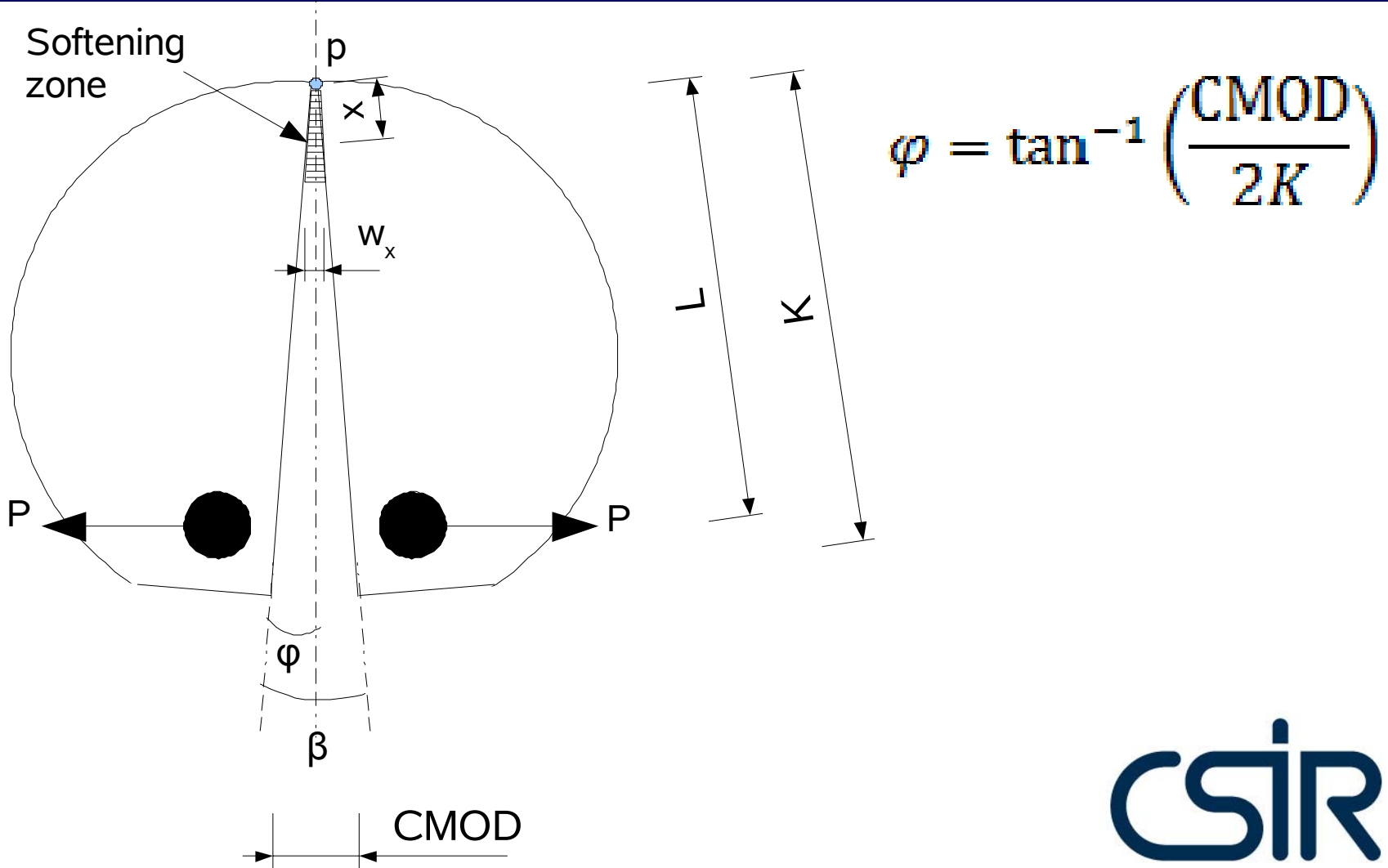
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Determining full work of fracture

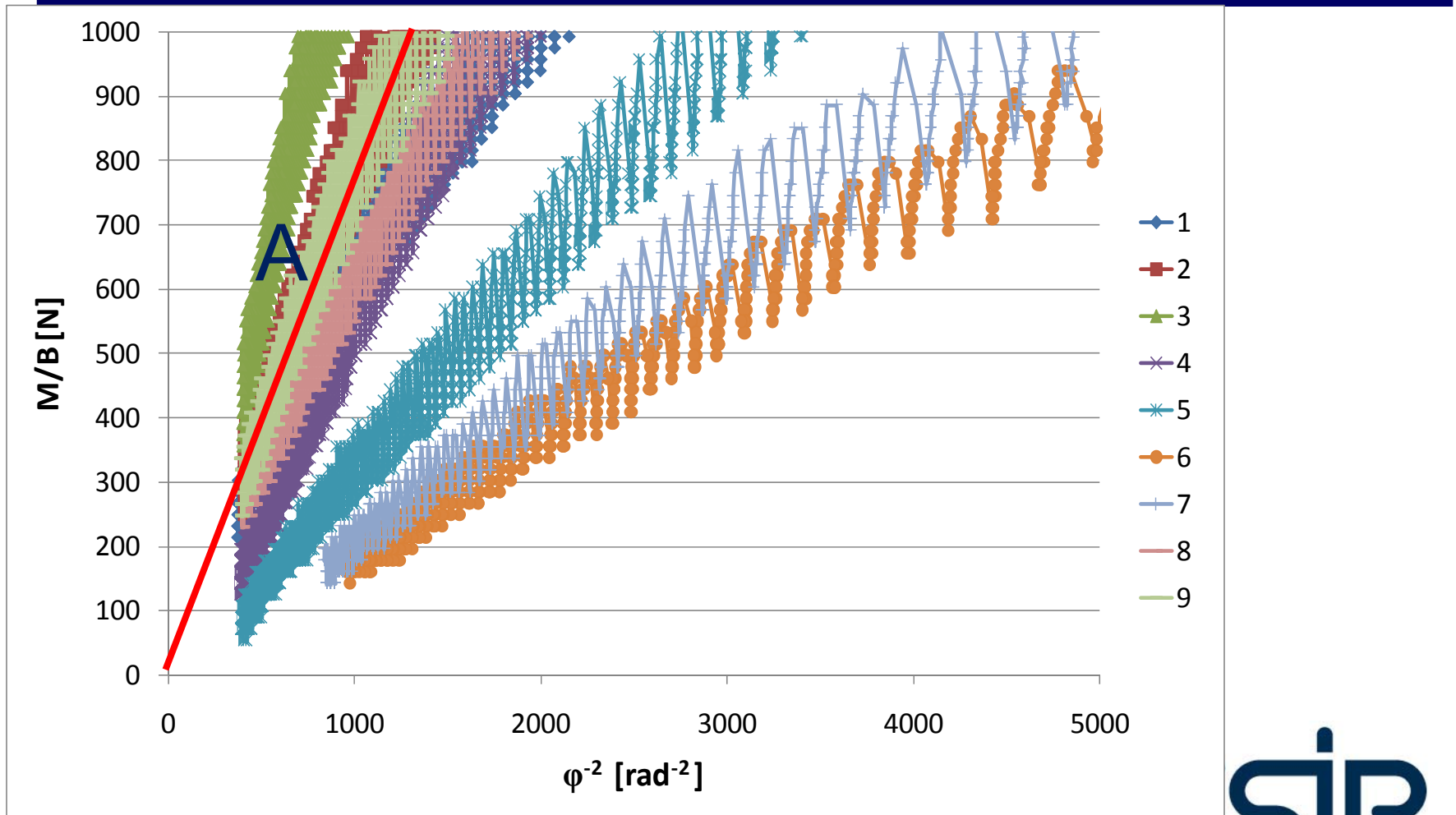


$$G_f = \frac{W_f}{t(K - a)}$$

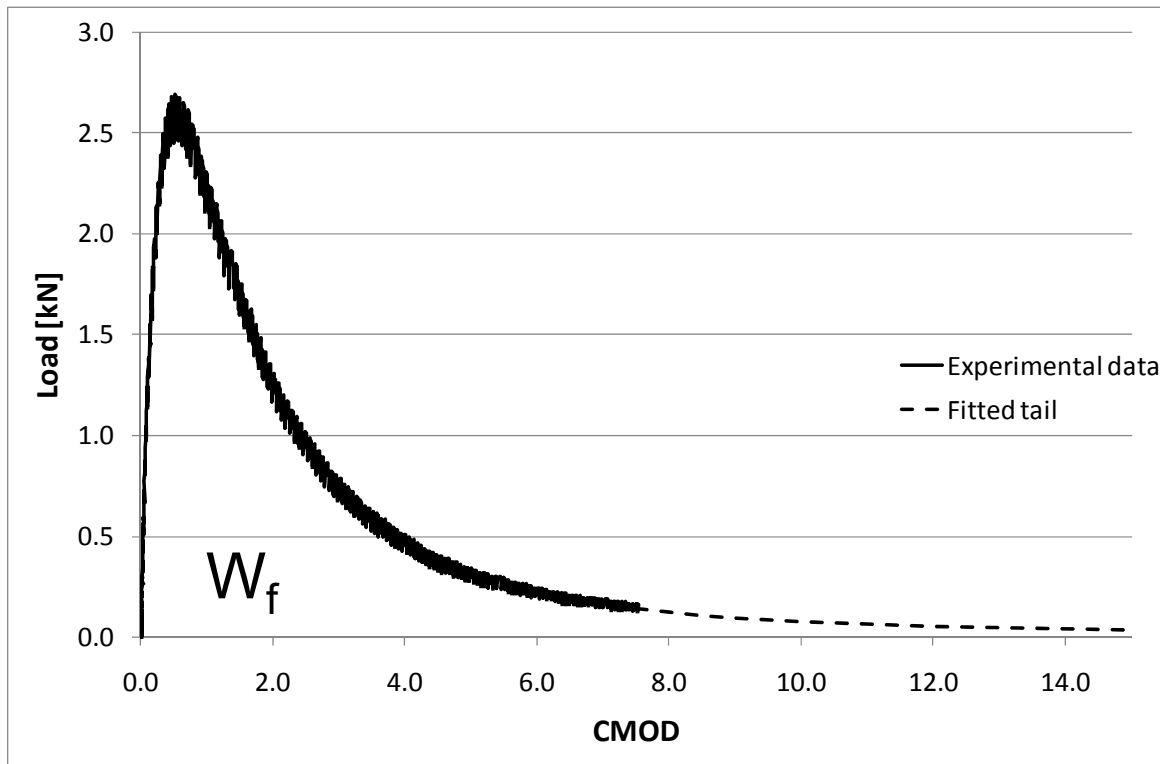
Determining full work of fracture



Determining full work of fracture



Determining full work of fracture

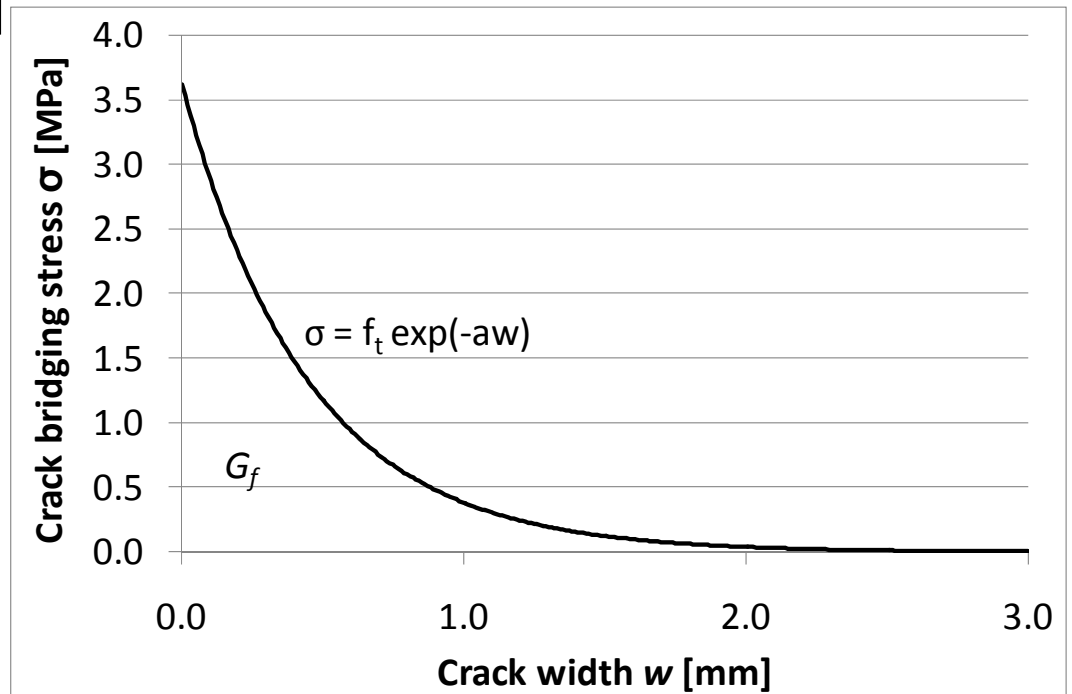
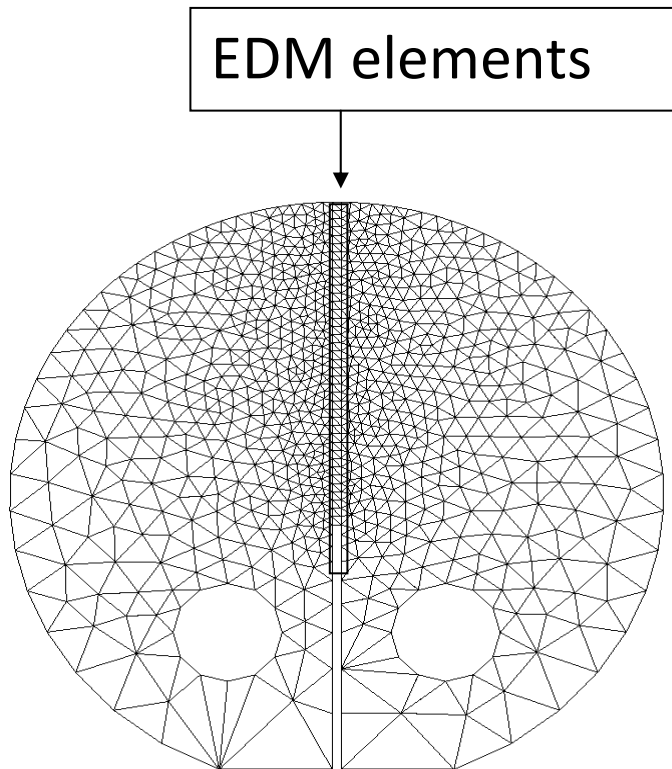


$$P_{tail} = \frac{At}{L\beta^2} \approx \frac{AK^2t}{CMOD^2L}$$

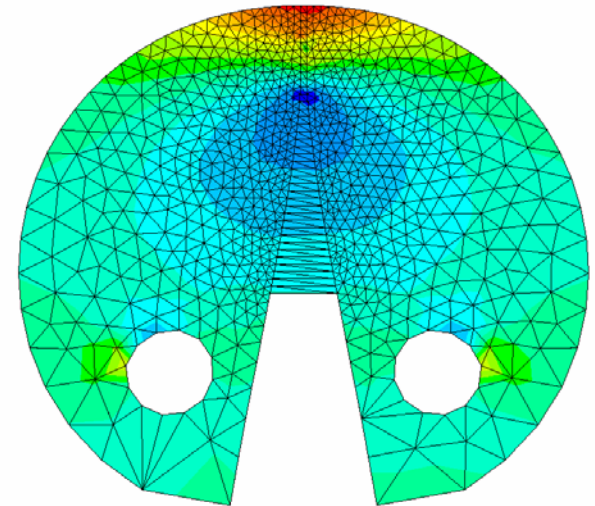
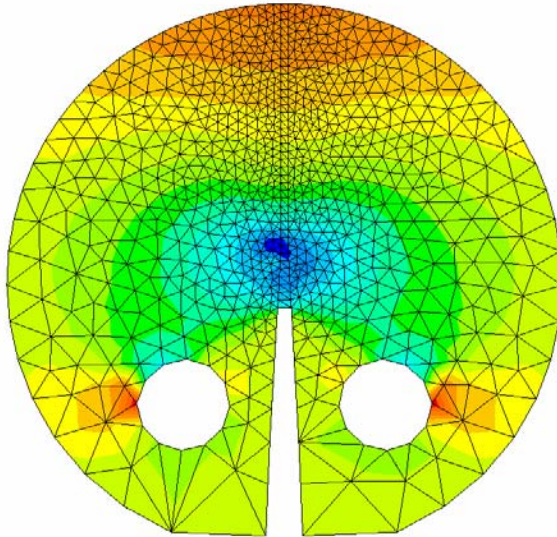
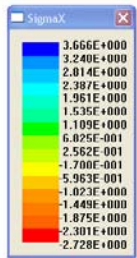
$$W_{tail} = \int_{CMOD_{max}}^{\infty} P_{tail} d(CMOD) = \int_{CMOD_{max}}^{\infty} \frac{AK^2t}{CMOD^2L} d(CMOD)$$

$$= \frac{AK^2t}{CMOD_{max} \cdot L}$$

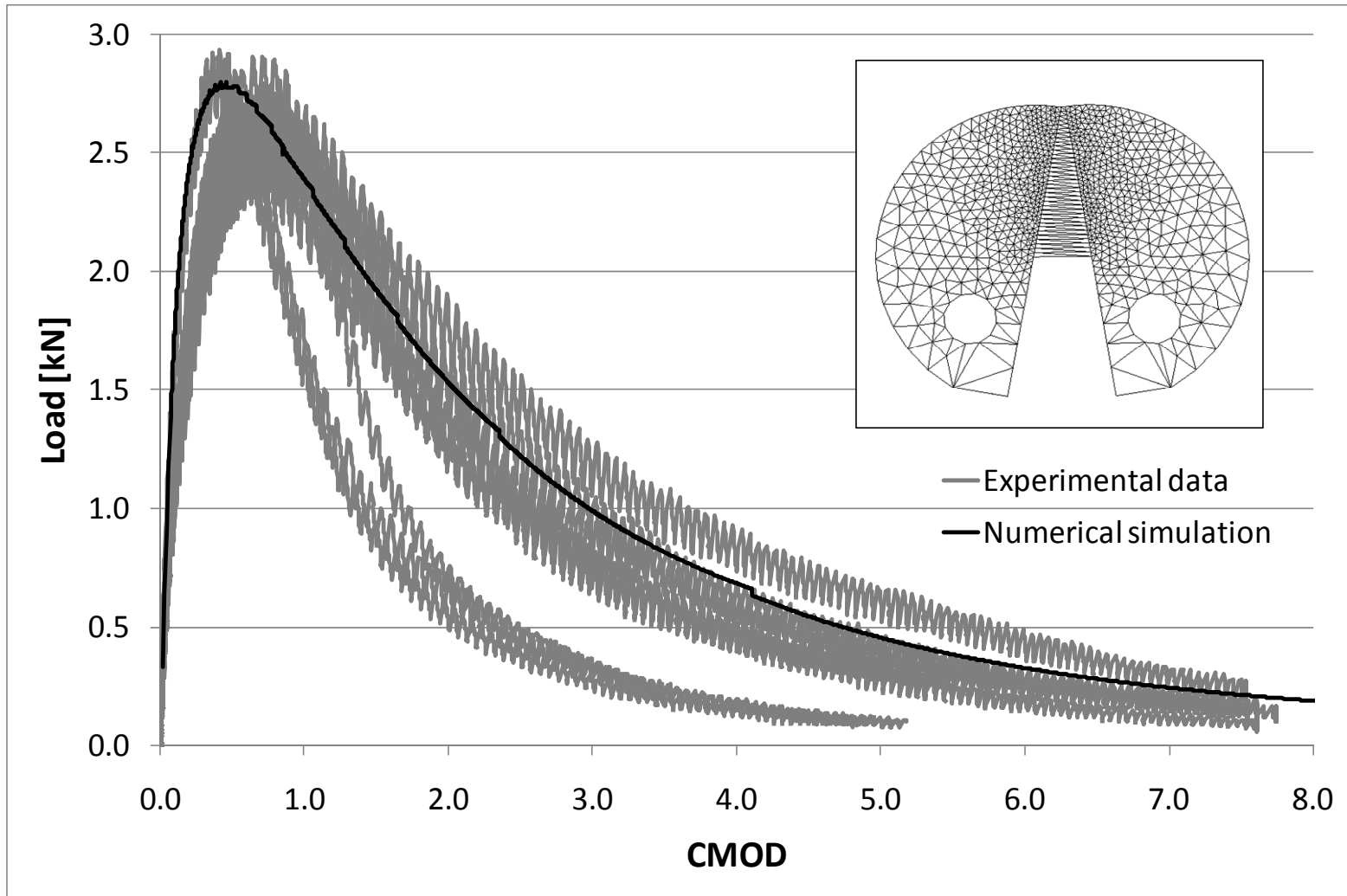
Numerical simulation



Numerical simulation



Numerical simulation



Conclusions

- If DSCTT is performed in accordance to ASTM a portion of work of fracture will be missing,
- The missing tail can be modelled using the procedure in the paper,
- G_f and ITS values can be used to simulate fracture propagation in material,
- Fracture mechanics based study on accuracy, size effect and boundary conditions ITS test is required.

Questions?

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