Experimental and numerical comparison of different test methods for fibre-reinforced concrete

L. Grepstad Nes[*], S.I. Sørensen[†]

March 15, 2010

Concerning fibre-reinforced concrete, there exist several widely accepted test methods for determining material properties, e.g. beam bending, uni-axial and round panel tests. However, the response from these small-scale tests exhibit fundamental differences due to the test method, but also the type of fibre-reinforcement and concrete quality plays an important role for interpretation of the results.

The finite element method is a strong tool for both predictive and inverse analyses when investigating material behaviour, but caution has to be taken due to description of concrete cracking. Some of the mentioned test methods lead to a predictable crack pattern which enables use of simple discrete cracking models, while other test methods is not so predictable which makes use of smeared cracking models more suitable.

Based on experimental testing performed at NTNU, a comparison of the response from different test methods is made. The experimental program covers several comparable beam bending, uni-axial and round panels tests, and inverse numerical analyses are performed by DIANA in order to determine important material properties.

[*]Ph.d student at NTNU, Department of Structural Engineering, Trondheim, Norway
[†]Professor at NTNU, Department of Structural Engineering, Trondheim, Norway