THE PARAMETER ESTIMATION FROM THREE-POINT BENDING TESTS

I. Kožar[1,*], T. Sulovsky[1], M. Plovanić[1], Ž. Božić[2]
[1]*University of Rijeka, Faculty of Civil Engineering, R. Matejčić 3, 51000 Rijeka, Croatia*
[2]*University of Zagreb, Faculty of Mech. Eng. And Nav. Arch., I. Lučića 5, 10000 Zagreb, Croatia*

Understanding of experiments is only possible with an appropriate model of the process being monitored. The model must be as simple as possible (the Parsimonious principle). Our beam fracture model has only two parameters. It is a bending beam model extended to describe the fracture in a three-point bending test. The model is nonlinear because the parameters change as the load changes. We would like to use an inverse procedure to determine the two parameters of the model using the recorded experimental data. The recorded parameters must describe the experiment completely and unambiguously. In the case of three-point bending tests, the complete set of recorded data includes force, displacement, and CMOD values. Our work compares the recorded data with the parameters required to simulate the experimental behaviour.

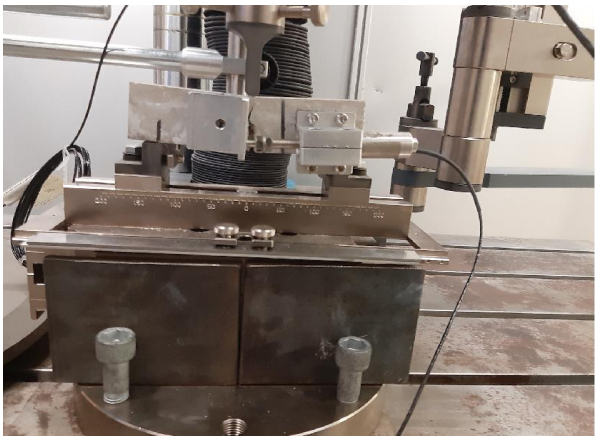

Fig. 1. Experimental setup for the three-point bending test.

Figure 1 shows the experimental setup for the three-point bending test. A rod for force application (with force sensor on the test machine) and sensors for measuring deflection and CMOD can be seen.
This work is an extension of our previous work. In [1] we developed a simple model to simulate the three-point bending test, in [2] there is a stochastic version of the concrete material model, and in [3] we verified the proposed model.

References

[1] Kožar, I., Bede, N., Mrakovčić, S. & Božić, Ž. (2021) Layered model of crack growth in concrete beams in bending. *Procedia Structural Integrity*, 31, 134-139.
[2] Kožar, I., Bede, N., Bogdanić, A. & Mrakovčić, S. (2021) Data driven inverse stochastic models for fiber reinforced concrete. *Coupled Systems Mechanics*, 10 (6), 509-520.
[3] Kožar, I., Bede, N., Mrakovčić, S. & Božić, Ž. (2022) Verification of a fracture model for fiber reinforced concrete beams in bending. *Engineering failure analysis*, 138, 106378, 10.

* Corresponding author
E-mail address: ivica.kozar@uniri.hr (I. Kožar)