The main objective of the research: to create a model which is able to predict the stress variation in the reinforcement due to given crack kinematics for the purpose of the fatigue verification of existing concrete bridges.

One of the cases when cracks might be problematic refers to the stress concentration in steel reinforcing bars close to cracks due to the dowel action (the transverse force causing the local bending of the reinforcement).

Results of monotonic and cyclic dowel tests

What can we learn?

- Dowel action highly depends on the dowel diameter (Øs), imposed crack kinematics (δ⊥, δ∥) and dowel-crack inclination (θ).
- Monotonic and cyclic tests are correspondent.
- A typical rupture mode is the local concrete crushing with the rupture of the dowel bar at the crack position.

Cracks: Are our bridges “tired”?

Stress vs. kinematic components

On the basis of these results including sufficient additional tests, a model can be created enabling to predict stress variations in the reinforcement due to different crack kinematics.

Optical fibres-based test results

Experimental investigation of dowel action using advanced measurement techniques

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