

## Summary

### **Bending moment redistribution in two span continuous beams and slabs with FRP reinforcement**

Redistribution of bending moments can be defined as a shift in the distribution of internal forces under the influence of changes in the load and stiffness of the element. In beams with steel reinforcement, the key parameter that enables the redistribution process is the ability of the steel reinforcement to yield and deform plastically. Furthermore, it has been observed that redistribution of moments also occurs in beams reinforced with FRP bars. This redistribution takes place despite the fact that these bars are characterized by their linearly elastic stress-strain characteristics.

The primary objective of this study is to verify the capacity of concrete slabs and beams reinforced with FRP bars to redistribute bending moments. A further significant aspect of this research is the determination of the most critical parameters affecting the capacity of slabs and beams to redistribute moments. The objectives of the work were achieved by analyzing the existing state of the art in the field of research on the redistribution of bending moments in continuous elements, along with the program of own research and the modeling in the program of nonlinear analysis. In addition, parametric analysis was carried out on the previously selected most significant parameters.

The experimental program included four two-span continuous slabs under a five-point bending test. Two slabs were reinforced with glass fiber rods (GFRP), and two were reinforced with steel. Within each reinforcement group, the first element was designed as a reference under the assumption of no redistribution of bending moments, and the second element was designed with the assumption of redistribution to the span.

Experimental studies confirmed that slab elements with GFRP reinforcement can significantly redistribute bending moments. Unlike steel-reinforced elements, the ability to redistribute in FRP-reinforced elements is determined by the plastic properties of the concrete, the element's stiffness, and cracking. The following parameters were selected for further parametric analysis in the ATENA program: the degree of reinforcement of the section in the span and at the supports, the type of FRP reinforcement (GFRP or CFRP), the concrete class, and the type of element (beam or slab). The computational models show agreement with the experimental studies.

Keywords: redistribution of bending moments, two-span continuous beams and slabs, FRP reinforcement

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