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Innovative methods of strengthening building structures using domestic composite materials and technologies

Abstract: A comprehensive test of 105 reference and reinforced with the use of various types of composite materials, bent and compressed reinforced concrete elements was carried out.

The following were studied: bending elements under the action of bending moments; bending elements under the action of transverse forces; compressed elements under various types of stress-strain state.

New experimental data have been obtained on the strength, opening width of normal and inclined cracks, as well as the deformability and stiffness of bent and compressed reinforced concrete elements.

The influence of the following factors on the change in the bearing capacity of the prototypes has been established for both the first and second groups of limit states. More specifically: from the type and percentage of steel and composite reinforcement and the presence or absence of supporting clamps – under the action of bending moments; from the type of external transverse clamps and the size of the cut span in the presence or absence of initial inclined cracks – under the action of transverse forces; from the type and intensity of external longitudinal and transverse reinforcement in the presence of closed clamps at the ends reinforcement elements; from the magnitude of the eccentricity and flexibility of the compressed elements at the magnitude of the eccentricity e_0=0 (conditionally centrally compressed elements); e_0=0.16h (small eccentricities); e_0=0.32h (large eccentricities).

A comparison of the experimental and theoretical bearing capacity of reinforced elements was carried out when calculating strength, deformability and stiffness.

Experimental and theoretical developments aimed at improving the regulatory framework of Russia have been carried out. The possibility of increasing the rational maximum flexibility of the reinforced elements and the ratio of their cross-sectional dimensions has been established.

Recommendations for improving the calculation apparatus and design requirements for strengthening bent and compressed reinforced concrete elements are proposed.