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(VSU) "LYBEN KASRAVELOV"

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**XIX МЕЖДУНАРОДНА НАУЧНА КОНФЕРЕНЦИЯ ПО
СТРОИТЕЛСТВО И АРХИТЕКТУРА ВСУ'2019**

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Union of Architects in Bulgaria



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Article 4.01 **Progressive Collapse of Existing RC Structures due to Environmental Effects: A Numerical Approach for Strengthening by Ties**

A. Liolios¹, D. Partov², K. Liolios³, B. Folic⁴ and G. Skodras⁵

Existing old reinforced concrete (RC) buildings are sometimes subjected to obligatory removal of some structural element-members, e.g. columns, and so to the risk of a progressive collapse. This happens due to various reasons, which can concern changes of serviceability and requirements, or environmental effects which cause strength degradation etc. In order to avoid such a progressive collapse, a modification of the structural response and a redistribution of internal actions can result to a requirement for strengthening the remaining structure after the removal of the degraded elements. The present study deals with such a case, which concerns the computational analysis of framed RC structures under the removal of some columns and the so-induced requirement of a strengthening by ties (tension only elements). The unilateral behaviour of these cable-ties, which can undertake only tension, is strictly considered, and the response of the remaining historic structure strengthened by ties is computed. Finally, in a practical case of a framed RC structure, the effectiveness of the proposed methodology is shown.

Key Words: *Progressive collapse of old RC structures, Removal of columns, Strengthening by ties*

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