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APPLICABILITY AND ECONOMIC EFFICIENCY OF SEISMIC RETROFIT MEASURES ON HISTORIC BUILDINGS

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Retrofit interventions on buildings at seismic risk are challenging, as historic substance is basis for all planning and construction efforts. A retrofit system is implemented through an adequate technical as well as an adequate management strategy. This paper describes the investigation of interdependencies between functional, aesthetic and constructive characteristics of buildings and the chosen retrofit strategy. The motivation is the necessity to develop specific retrofit measures for historic buildings in the capital of Romania, characterised through a maze of buildings with different structure, age, state and scale, where retrofit measures have been applied isolated on few buildings. In the past five years earthquake engineering grew in importance but integrated concepts for retrofit strategies are still missing. During the PhD research work, the author analysed the building stock in Bucharest both typologically and area based. The most vulnerable type found are residential multi-storey reinforced concrete frame buildings from interwar time. The concept of "retrofit elements" has been developed to support decision regarding the applicability and economic efficiency of the strategy. These are spatial elements which are characteristic for the survey, present typical earthquake damages and are decisive for a better seismic behaviour in case of retrofitting. To each retrofit element recognition characteristics, construction works with duration/needed resources, implied costs for retrofit/reparation, earthquake resiliant features, seismic deficiencies and earthquake damage patterns were assigned. With their help the structural performance was assessed stress-strain based, then repair and retrofit costs calculated. In a performance based retrofit approach the so-called "costs curves" were computed. They show the conceptual dependency between the "Bemessungsbeben" (="design earthquake", Bachmann, 1995) and retrofit/repair costs, supported by numerous simulation results.