ASSESSMENT OF STRUCTURAL RETROFITTING AND ENERGY EFFICIENCY THROUGH TESTING, MODELLING AND MONITORING

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Abstract

The present thesis briefly summarizes the most important scientific, professional and academic achievements of the candidate after defending his PhD thesis at the Politehnica University Timisoara. The candidate was member in 11 national and 5 international research grant or program, in 4 as coordinator. The main area of the researches was in the field of Structural Strengthening using FRP Composites (13 grants), while in the last 3 years interest was shifted towards to the Structural Health Monitoring and Energy Efficiency of structures.

The research performed on FRP Composites was focused on the development of new and innovative anchorage systems and strengthening technologies for reinforced concrete beams, on the study of the confining effect of carbon and glass fiber reinforced polymers (FRP) and their superposition with the application of innovative near surface mounted (NSM) steel and FRP bars were studied. Another subject was the investigation of the influence of various sized cut out openings created in structural walls and slabs retrofitted using externally bonded and NSM FRP composites. In parallel, the subject of advanced techniques used for structural strengthening of masonry elements was also performed. The efficiency of solutions was categorized in terms of resistance, ductility and costs, and a new strengthening solution was proposed and investigated, based on a new concept of steel wire mesh applied with epoxy resins. Use and application of FRP strengthening methods in the field of steel-concrete composite walls was also considered. One of the most promising results of the experimental program was a further development of an anchorage system used for FRP lamelas subjected to bending superposed with a confinement FRP fabric. Later on, full scale precast prestressed concrete element support zone was studied and the strengthening possibilities were analysed. Based on the initial nonlinear modelling, the strengthening strategy was determined and experimentally tested, than was followed by a numerical calibration and by an extension of the strengthening matrix.

The second subject of research covered by the candidate is related to the Structural Health Monitoring of Energy Efficient Buildings, in order to validate design principles, to evaluate real energy demands and to optimize and reduce energy consumptions. This field is time dependent, because it is based on recorded parameters throughout several years. In these on-going projects the objectives were to conceive, realize and put in function a complex monitoring system, to collect data from internal and external parameters and finally to provide a practice guide based on the results.

The full abstract at:
http://www.upt.ro/img/files/2015-2016/doctorat/abilitare/nagy-gyorgy/3_Abstract_Nagy-Gyorgy_Tamas_en.pdf

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