

Engineering Seminar

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**“SEISMIC BEHAVIOR OF RC COLUMNS WITH CORRODED
REINFORCING BARS”**

ABSTRACT

One of the major problems in the structural sector is the rehabilitation of the old and damaged structure stock. Corrosion of reinforcing bars and the resultant cracks in concrete structural members are among the most common reasons of damage that require repair, particularly in humid environments and/or where porosity of concrete is relatively higher. Depending on the corrosion level, the bond between concrete and steel reinforcement is impaired which causes a risk for seismic safety of the existing RC structures.

An experimental and analytical study is carried out for investigating the seismic performance of the corrosion damaged RC columns with plain and deformed bars. Three types of specimens were produced, subjected to accelerated corrosion process and tested under constant axial load and reversed cyclic loads. The first group of specimens represents the existing structures which were built conforming to old design codes (low strength concrete, plain bar, insufficient transverse reinforcement detailing) which are usually encountered in Turkey. The second group of specimens was constructed in accordance with new design code (normal strength concrete, deformed bar, sufficient transverse reinforcement detailing). The third group was similar to the first group specimens with an additional hook detailing of longitudinal bars.

In the analytical phase of the study with corroded plain reinforcing bars, the effect of bond mechanism and loss of cross-section of reinforcement was investigated based on the experimental study. In the analytical phase of the study with corroded deformed reinforcing bars, nonlinear pushover analysis and nonlinear time history analysis of a hypothetical RC structure which has columns with corroded deformed reinforcing bars (with the assumption of pitting corrosion) was investigated. The corrosion of deformed reinforcing bars was represented with different losses of cross-section of reinforcement and different distribution of pits on the reinforcing bars based on the experimental study.

DATE: Wednesday March 7th

TIME: 1:00-3:00 P.M.

LOCATION: 140 KETTER HALL, NORTH CAMPUS, UNIVERSITY AT BUFFALO

WEBCAST URL: [HTTP://CIVIL.ENG.BUFFALO.EDU/WEBCAST/](http://civil.eng.buffalo.edu/webcast/)

TECHNICAL DIFFICULTIES: SEESLWEBCAST@BUFFALO.EDU

ORGANIZED BY: CSEE-GSA, Student Chapter of EERI at UB, MCEER and Dept. of CSEE

Refreshments will be served !!!

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Dr. Caglar GOKSU AKKAYA works at Istanbul Technical University Civil Engineering Faculty, Structural and Earthquake Engineering Laboratory. She has her PhD from ITU (2012). She is a researcher at EU-FP-7, Series Project - Seismic Engineering Research Infrastructures for European Synergies. She has certificates of “Retrofitting of Concrete Structures through Externally Bonded FRP”, and “Static and Pseudodynamic Experimental Testing”. She gave workshops on “Seismic Performance of Reinforced Concrete Columns with

Corroded Reinforcement and Repair of Corrosion” and “Precautions for Disasters” within the scope of ISMEP - World Bank Project. She participated in the Conference Organization Committee Memberships (SMAR’13 - “Second Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures”, Istanbul, Turkey, 9-11 September 2013 and “SERIES’12 - “Seismic Engineering Research Infrastructures for European Synergies”, Istanbul, Turkey, 8-9 February 2012).

Current research interests include :

- Seismic retrofit of existing sub-standard RC members under reversed cyclic flexural effects
- Increasing deformability of FRP confined low and medium strength concrete through a cement based mortar layer
- Failure mechanisms of old and new type RC columns after reinforcement corrosion
- Seismic analysis of a RC frame building with FRP retrofitted infill walls
- Prefabricated SFRC panels for occupant friendly seismic retrofit of reinforced concrete columns
- The effects of lap spliced low strength RC columns on structural performance under different axial loads
- Seismic retrofit of existing sub-standard RC members under reversed cyclic flexural effects with NSM