



Cyprus
University of
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Master's Thesis

**INVESTIGATION OF THE PERFORMANCE OF RC
BUILDING WITH SMOOTH BARS**

Xenia Kkosti

Limassol, December 2018

CYPRUS UNIVERSITY OF TECHNOLOGY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING AND GEOMATICS

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Approval Form

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The approval of the thesis by the Department of Civil Engineering and Geomatics does not imply necessarily the approval by the Department of the views of the writer.

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ABSTRACT

The best resemblance of building columns is column specimens with stability at top and bottom, but few of those tested so far had smooth bars and even then without bar lap-splicing at floor level. Empirical models based on single column tests, especially the numerous ones with cantilever-type specimens, cannot be readily extended to columns with smooth bars in real-life buildings. Physical models of the Strut-and-Tie type are developed and are validated. Their scope includes anchorage and splicing of bars with either hooks or straight ends. Once validated, they are adapted to real-life multistory rectangular RC columns with smooth bars, to obtain the column properties of interest: the chord rotation at yielding and the cyclic ultimate chord rotation, with or without FRP jacketing. Different expressions apply to the top and bottom end of a column in a story, but one is used to estimate the column's effective stiffness. With the help of the physical models the estimation of the stiffness and ultimate deformation of columns with smooth bars in real-life buildings is possible.

Keywords: Smooth bars, Yield moment, Chord rotation