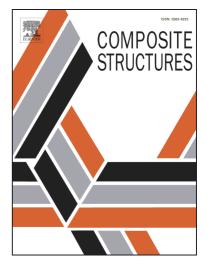
## Accepted Manuscript

## letter

Seismic retrofit of square reinforced concrete columns using basalt and carbon fiber-reinforced polymer sheets: a comparative study

Li-Jun Ouyang, Wan-Yang Gao, Bin Zhen, Zhou-Dao Lu

PII:	S0263-8223(16)32780-5
DOI:	http://dx.doi.org/10.1016/j.compstruct.2016.12.016
Reference:	COST 8071
To appear in:	Composite Structures
Received Date:	1 February 2016
Revised Date:	6 December 2016
Accepted Date:	6 December 2016



Please cite this article as: Ouyang, L-J., Gao, W-Y., Zhen, B., Lu, Z-D., Seismic retrofit of square reinforced concrete columns using basalt and carbon fiber-reinforced polymer sheets: a comparative study, *Composite Structures* (2016), doi: http://dx.doi.org/10.1016/j.compstruct.2016.12.016

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Seismic retrofit of square reinforced concrete columns using basalt and carbon fiber-reinforced polymer sheets: a comparative study

Li-Jun Ouyang<sup>1</sup>, Wan-Yang Gao<sup>2</sup>, Bin Zhen<sup>3</sup>, and Zhou-Dao Lu<sup>4</sup>

**Abstract:** This paper presents results of an experimental program in which basalt and carbon fiber-reinforced polymer (FRP) sheets are used as confining jackets to enhance the seismic performance of square reinforced concrete (RC) columns with inadequate transverse reinforcement. Crack patterns, failure modes, lateral hysteresis loops, displacement ductility, energy dissipation capacity and stiffness degradations of one unretrofitted column and five retrofitted columns are presented and discussed. The effects of the amount and type of FRP sheets on the seismic behavior of the retrofitted columns are also examined. Experimental results indicate that the unretrofitted column has poor ductility with brittle shear failure, while the FRP jackets are useful in enhancing the seismic resistance of the retrofitted columns and result in more stable hysteresis loops with improved energy dissipation capacity and lower stiffness degradations. The columns retrofitted with BFRP sheets have equivalent or even superior seismic performance compared to counterparts that are retrofitted with the same number of layers of carbon FRP (CFRP) sheets, and the material costs of the former are only 20% that of the latter. It has been demonstrated that the BFRP composites have promising potential for use as an alternative to conventional FRPs for seismic retrofit of square RC columns.

**Keywords:** Concrete column; Fiber-reinforced polymer (FRP); Basalt fiber; Seismic load; Ductility; Energy dissipation.

<sup>&</sup>lt;sup>1</sup> Lecture, School of Environment and Architecture, University of Shanghai for Science and Technology, Shanghai, 200093, China. E-mail: ouyang@usst.edu.cn.

<sup>&</sup>lt;sup>2</sup> Postdoctoral Fellow (Corresponding author), Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong, China. Tel: (852) 27664476; Fax: (852) 23346389; E-mail: wangao@polyu.edu.hk.

<sup>&</sup>lt;sup>3</sup> Associate Professor, School of Environment and Architecture, University of Shanghai for Science and Technology, Shanghai, 200093, China.

<sup>&</sup>lt;sup>4</sup> Professor, Research Institute of Structural Engineering and Disaster Reduction, Tongji University, Shanghai, 200092, China.

Download English Version:

## https://daneshyari.com/en/article/4912270

Download Persian Version:

https://daneshyari.com/article/4912270

Daneshyari.com