



A repair and retrofitting intervention to improve plastic dissipation and shear strength of Chinese rc bridges

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Abstract

In this paper a rapid repair and retrofitting technique for reinforced concrete (rc) Chinese bridges damaged by a strong earthquake, is proposed and tested. This intervention is an upgrade of the one tested with very good results during a previous experimental research on bridges designed according to the old Italian code without proper seismic details. The improvement of the repair operation consists in the use of dissipation systems to substitute the damaged rebar parts at pier base guaranteeing the correct plastic distribution in plastic hinge only. Dissipation systems with different configurations were considered to optimize the intervention. The repaired and retrofitted Italian bridge already studied in the previous research, was designed according to Chinese codes but with insufficient transversal steel reinforcement. Some pier specimens (scale 1:6) of the most stressed pier of this bridge, with and without dissipation systems, were built. A C-FRP wrapping was applied to increase the insufficient shear strength and the ductility in plastic hinge. Cyclic tests were carried out on the scaled specimens at Fuzhou University lab (China) to evaluate the effectiveness of the proposed technique.

Keywords: repair, retrofitting, Chinese existing rc bridge, dissipation, C-FRP

1 Introduction

The repair and the retrofitting of seriously damaged rc bridge pier after a strong earthquake [1], can be a valid and economic alternative with respect to reconstruction. Furthermore, this intervention can be realized in short time allowing the use of bridge for emergency response.

In this paper, the repair and retrofitting of Chinese Bridge [2] [3] [4] is presented.

The retrofitting of the rc piers can be done using different techniques as concrete jacketing [5] [6]

[7], steel jacketing [8] [9] [10] and FRP (fiber reinforced polymer composite) wrapping [11] [12] [13]. These techniques can be used after the repair of damage on the pier due to a strong earthquake.

Some rapid repair interventions, which permit quick opening of the bridge to emergency response, were presented in literature [14] [15] [16]. Some of the authors proposed a new rapid repair and retrofitting technique [17], applied successfully on damaged Italian old bridges with insufficient seismic details [1] [18]. This intervention consists in the repair of the damaged