

Abstract

In recent years, fiber-reinforced polymers (FRPs) materials have shown great potential as materials for repair and reinforced concrete structures such as beams or columns by externally bonding FRP sheet(s) onto the surface of substrate concrete structures. However, the performance of FRP systems exposed to fire is a serious concern due to the combustibility of FRPs. This study introduces the results of an experimental investigation on the behavior of the circular columns of concrete under a load of axial compression, confined by an envelope of composite materials (carbon fiber and glass fiber) and protected by a layer of mortar cement or plaster coating, after they have been subjected at various temperature (23, 120, and 350 °C). The specific objectives of this study are verifying the applicability and the effectiveness of the proposed technique to improve the behavior of concrete in fire resistance and evaluate the effect of composite materials and the layer coating type used. The results indicated that protecting heat circular confined columns, with a layer of mortar cement or plaster has a significant effect on the axial strength and the ductility. It was shown that the ultimate load and axial strain of heated columns can be restored up to the original level or greater than those of unheated columns. However, the effect of a layer of plaster is more significant than a layer of mortar cement. So this coating system would enhance fire resistance of the FRP, safety and reliability of FRP reinforced concrete structures