

## THE EFFECT OF MULTI LAYERS OF CFRP ON LOADING CAPACITY OF STRENGTHENED REINFORCED CONCRETE BEAMS BY EBROG METHOD AND COMPARING IT BY USING ONE LAYER OF AFRP

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### ABSTRACT

Externally Bonded Reinforcement On Grooves (EBROG) is a new promising method that has been introduced at Isfahan University of Technology (IUT) to postpone or eliminate debonding of FRP sheets from concrete surface in concrete beams strengthened for flexure. Experiments have shown that the probability of debonding when attached to concrete substrate using EBROG method is much lower than the other methods; and in some cases debonding is completely eliminated. The aim of the current study is to examine the efficacy of grooving method when used under multilayer CFRP sheets analytical and comparing it with the results of one layer of AFRP. For this purpose, beam specimens with dimension 120\*140\*1000 mm were modeled in ABAQUS program. We assigned concrete damage plasticity for concrete, and fully elasto-plastic for both steel and CFRP and AFRP. We use dynamic,explicit analysis and meshed the specimens by 0.02m size. The interaction between mesh bar and concrete beam was embedded and interaction between CFRP, AFRP and concrete beam was tie. Using mesh bar is related to preventing any shear failure . Finally, the results shown that using 3 layers of CFRP is much better than 1 layer of AFRP . The rate of increment loading capacity is about 51.85 percent .

**Keywords:** Aramid Fiber Reinforced Polymer (AFRP); Carbon Fiber Reinforced Polymer (CFRP), strengthening, Externally Bonded Reinforcement on Grooves (EBROG), loading capacity, ABAQUS program

### INTRODUCTION

Over the past decade, conventional materials such as concrete and steel are being replaced by Fiber Reinforced Polymer (FRP) composites for repairing and rehabilitation of concrete structures. Numerous advantages such as high tensile strength, high durability and corrosion resistant, low weight and easy installation, and no limitation in size and configuration, have made FRP to be highly desirable and implemented in a large number of practical projects worldwide.