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1 **Bar-Concrete Bond in Mixes Containing Calcium Carbide Residue, Fly Ash and**
2 **Recycled Concrete Aggregate**

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9 **ABSTRACT**

10 A mixture of calcium carbide residue and fly ash (CRFA) is an innovative new
11 binder for concrete instead of using ordinary Portland cement (OPC). Therefore, this
12 study aims at investigating the bond interaction between common steel reinforcing
13 bars and the aforementioned concrete. To this end, both CRFA and OPC concretes
14 using crushed limestone and recycled concrete aggregate (RCA) as a coarse aggregate
15 were prepared to investigate the bond strength of smooth and deformed bars by pull-
16 out tests. The bond stress–slip relationships were also identified to determine the
17 effects of CRFA binder and RCA on the bond strength behavior. The results indicate
18 that the values the of bond-slip behavior and bond strengths of steel bar in CRFA
19 concretes are similar to those embedded in OPC concrete. Moreover, the bond strength
20 was significantly affected by RCA and the types of steel bar. Although the concretes
21 had the same compressive strengths, the deformed bar embedded in CRFA concrete
22 with RCA had a lower bond strength than the one with crushed limestone. However,
23 the reduction in bond strength of the CRFA concrete with RCA was still less than that
24 of OPC concrete with RCA. For the CRFA concretes, the bond strengths of the
25 deformed bars were approximately 1.7–3.6 times higher than that of smooth bars.

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