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AVOIDING SHORT CIRCUITS IN 2-FACTORS OF CUBIC GRAPHS

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Each bridgeless cubic graph has a perfect matching and thus it has a complementary 2-factor. We develop techniques to construct 2-factors with bounded number of circuits of prescribed length(s) (for lengths 2 to 7) with focus on circuits of length 5. We show that a bridgeless cubic graph G of order n other than Petersen graph has a 2-factor with at most $(n - 2)/7.5$ circuits of length 5. If G is 3-edge-connected, the bound improves to $n/9$. Both bounds are attained for infinite family of graphs. If G is cyclically 4-edge-connected, the bound improves to $n/10$. We sketch application of our results to short cycle covers and travelling salesman problem on cubic graphs.