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Cun-Quan Zhang* (cqzhang@math.wvu.edu), Dept. Mathematics, POBox 6310, Morgantown, WV 26506-6310. *Cycle covers – minimal contra pairs, Petersen chain and Hamilton weights.*

Let G be a bridgeless cubic graph and w be an eulerian weight $w : E(G) \mapsto \{1, 2\}$. A faithful circuit cover of the ordered pair (G, w) is a family F of circuits if every edge e of G is contained in precisely $w(e)$ members of F . A circuit C of (G, w) is removable if the graph obtained from G by deleting all weight 1 edges contained in C remains bridgeless. An ordered pair (G, w) is a contra pair if it has no faithful circuit cover, and a contra pair is minimal if (G, w) has no removable circuit and for every weight 2 edge e , the ordered pair $(G - e, w)$ has a faithful circuit cover.

Let (G, w) be a minimal contra pair. It is proved by Alspach, et al (Tran. AMS 1994) that if (G, w) is a minimal contra pair, then the graph G must contain a Petersen minor. It is further conjectured by Fleischner and Jackson that G must be the Petersen graph. We show that this conjecture is true if Hamilton weight conjecture is true.

Note, an ordered pair (G, w) is a Hamilton weight pair if every faithful circuit cover of (G, w) is a pair of Hamilton circuits. And Hamilton weight conjecture states that if every 3-connected Hamilton weight pair is constructed from K_4 via a series of $Y - \Delta$ -operations. (Received January 28, 2009)