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Hong-Jian Lai* (hjlai@math.wvu.edu), 320 Armstrong Hall, West Virginia University, Morgantown, WV 26506-6310, **Rui Xu**, Department of Mathematics, University of West, Carrollton, GA 30118, and **Cunquan Zhang**, Department of Mathematics, West Virginia University, Morgantown, WV 26506. *On circular flows of graphs.*

For an undirected graph G , the circular flow index of G is defined by

$$\phi_c(G) = \min_D \max_{\emptyset \neq X \subset V(G)} \frac{|\delta(X)|}{|\delta_D^+(X)|},$$

where the minimum is taken over all orientations of G . Galluccio and Goddyn in [Combinatorica, 22 (2002), 455-459] proved that if $\kappa'(G) \geq 6$, then $\phi_c(G) < 4$, using linear programming. We present a graph theory proof for the same result. Our result implies other family of graphs which may have edge-connectivity less than 6 can also have $\phi_c(G) < 4$ (Received January 15, 2008)