Graphs with flow indices less than 3

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It was showed that for a simple graph G with $|V(G)| \geq 44$, if $\min\{\delta(G), \delta(G^c)\} \geq 4$, then either G or its complementary graph G^c has a nowhere-zero 3-flow. We will improve this result by showing that if $|V(G)| \geq 32$ and $\min\{\delta(G), \delta(G^c)\} \geq 4$, then either G or G^c has a flow index strictly less than 3. Our result is proved by a newly developed closure operation and contraction method.

Besides this, we also consider the flow-property of graphs with spanning triangle-trees. A well-known classical theorem of Jaeger (1979) says that every graph with two edge-disjoint spanning trees admits a nowhere-zero 4-flow. We will prove that every graph with two edge-disjoint spanning triangle-trees has a flow strictly less than 3. We also show that all graphs with spanning triangle trees but without nowhere-zero 3-flow can be constructed from a K_4 by a so-called bull-growing operation. This generalizes a previous result on triangularly-connected graphs.

This is a joint work with Jiaao Li and Meiling Wang.

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