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Chandra Chekuri* (chekuri@cs.uiuc.edu) and **Sanjeev Khanna**. *Multi-route Cuts and Flows*. Preliminary report.

We study approximation algorithms for *multi-route cut* problems in undirected graphs. In these problems the goal is to find a minimum cost set of edges to be removed from a given graph such that the edge-connectivity between certain pairs of nodes is reduced below a given threshold K . In traditional cut problems, the edge connectivity is required to be reduced below 1, that is the pair is disconnected. We consider the case of $K = 2$ and obtain poly-logarithmic approximation algorithms for fundamental cut problems including single-source, multiway-cut, multicut, and sparsest cut. These cut problems are dual to multi-route flows that are of interest in fault-tolerant networks flows. We also show that the flow-cut gap for 2-route cuts and 2-route flows is poly-logarithmic in undirected graphs. The 2-route cut problems are also related to the feedback edge and node problems. (Received August 03, 2007)