1086-05-1287 **Xiaofeng Gu*** (xgu@math.wvu.edu). *Edge-disjoint spanning trees and eigenvalues in graphs.*

Let $\lambda_1(G)$, $\lambda_2(G)$ and $\tau(G)$ denote the largest eigenvalue, the second largest eigenvalue and the maximum number of edge-disjoint spanning trees of a graph G, respectively. Motivated by a question of Seymour on the relationship between eigenvalues of a graph G and bounds of $\tau(G)$, Cioabă and Wong conjectured that for any integers $d, k \geq 2$ and a d-regular graph G, if $\lambda_2(G) < d - \frac{2k-1}{d+1}$, then $\tau(G) \geq k$. They proved the conjecture for $k = 2, 3$, and presented evidence for the cases when $k \geq 4$. Thus the conjecture remains open for $k \geq 4$. We propose a more general conjecture that for a graph G with minimum degree $\delta \geq 2k \geq 4$, if $\lambda_1(G) + \lambda_2(G) < 2\delta - \frac{2k-1}{\delta+1}$, then $\tau(G) \geq k$. We prove that for a graph G with minimum degree δ, each of the following holds.
(i) For $k \in \{2, 3\}$, if $\delta \geq 2k$ and $\lambda_1(G) + \lambda_2(G) < 2\delta - \frac{2k-1}{\delta+1}$, then $\tau(G) \geq k$.
(ii) For $k \geq 4$, if $\delta \geq 2k$ and $\lambda_1(G) + \lambda_2(G) < 2\delta - \frac{3k-1}{\delta+1}$, then $\tau(G) \geq k$. In particular, for a d-regular graph G with $d \geq 2k \geq 4$, if $\lambda_2(G) < d - \frac{3k-1}{d+1}$, then $\tau(G) \geq k$. (Received September 20, 2012)