Guangzhou Discrete Mathematics Seminar

Upper bounds of the bichromatic number of some graphs

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For a pair of nonnegative integers k and ℓ, a graph G is (k,ℓ)-*colorable* if its vertices can be partitioned into $k+\ell$ subsets $S_1,\ldots,S_k,C_1,\ldots,C_\ell$ (possibly empty) such that each S_i is an independent set and each C_j is a clique in G. The *bichromatic number* $\chi^b(G)$ of G is the least integer r such that for all nonnegative integers k and ℓ with $k+\ell=r$, G is (k,ℓ)-colorable. Let $\chi(G)$ and $\theta(G)$ denote the chromatic number and the clique covering number of G, respectively. There is a natural upper bound $\chi^b(G)\leq\chi(G)+\theta(G)-1$. Epple and Huang (2010) characterized all extremal graphs G with $\chi^b(G)=\chi(G)+\theta(G)-1$. Let $r\geq 2$ be an integer, and let G be a graph with clique number less than $r+1$. In this talk, we show that $\chi^b(G)\leq\theta(G)+r-1$ if $r=2$ or 3, or if $r\geq 4$ and G is a line graph of a simple graph, and characterize all extremal graphs.