Séminaire du GERAD

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Salle **4488**, Pavillon André-Aisenstadt
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The Price of Connectivity for Vertex Cover and Dominating Set

In this talk, we investigate the ratio of the connected version of a problem to the original problem in graphs, called the *Price of Connectivity* (PoC). Firstly, we study the PoC for Vertex Cover. For general graphs, this ratio is strictly bounded by 2. We prove that for every (P_5, C_5, C_4)-free graph the ratio equals 1. We prove also that for every (P_5, C_4)-free graph the ratio is bounded by 4/3 and that for every $(P_7, C_6, \Delta_1, \Delta_2)$-free graph the ratio is bounded by 3/2, where Δ_1 and Δ_2 are two particular graphs. These results directly yields forbidden induced subgraphs characterizations of those graphs for which the PoC of every induced subgraph is bounded by t, for $t \in \{1, 4/3, 3/2\}$. Secondly, we study the PoC for Domination. The ratio of the connected domination number, γ_c, and the domination number, γ, is strictly bounded from above by 3. It was shown by Zverovich that for every connected (P_5, C_5)-free graph, $\gamma_c = \gamma$. We investigate the interdependence of γ and γ_c in the class of (P_k, C_k)-free graphs, for $k \geq 6$. We prove that for every connected (P_6, C_6)-free graph, $\gamma_c \leq \gamma + 1$ holds, and there is a family of (P_6, C_6)-free graphs with arbitrarily large values of γ attaining this bound. Moreover, for every connected (P_8, C_8)-free graph, $\gamma_c/\gamma \leq 2$, and there is a family of (P_7, C_7)-free graphs with arbitrarily large values of γ attaining this bound. In the class of (P_9, C_9)-free graphs, the general bound $\gamma_c/\gamma < 3$ is asymptotically sharp.

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