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Transpedances and Kirchhoff's Laws in (Di)graphs

Abstract for the Combinatorics Seminar 2005 October 11

The flow of current in an electrical network behaves according to Kirchhoff's Laws. I will discuss analogues of these Laws that hold for arbitrary directed graphs by analyzing a special class of spanning (directed) subgraphs for which a `transpedance' can then be associated to each directed edge. These transpedances satisfy Kirchhoff's Laws that can be extend to graphs to illustrate Kirchhoff's Laws for electrical networks. Time permitting, I will also discuss a (surprising?) computational method for calculating transpedances.
