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Xujin Chen, Guoli Ding* (ding@math.lsu.edu), **Xiaodong Hu** and **Wenan Zang**. *The Maximum-weight Stable Matching Problem.*

Given a preference system (G, \prec) and an integral weight function defined on the edge set of G (not necessarily bipartite), the maximum-weight stable matching problem is to find a stable matching of (G, \prec) with maximum total weight. In this talk we consider this *NP*-hard problem using linear programming and polyhedral approaches. We show that the Rothblum system for defining the fractional stable matching polytope of (G, \prec) is totally dual integral if and only if this polytope is integral if and only if (G, \prec) contains no so-called semistable partitions with odd cycles. We also present a combinatorial polynomial-time algorithm for the maximum-weight stable matching problem and its dual on any preference system containing no semistable partitions with odd cycles. Our results generalize Király and Pap's theorem on the maximum-weight stable-marriage problem and rely heavily on their work. (Received September 17, 2010)