1035-11-139 **Bala Krishnamoorthy*** (bkrishna@math.wsu.edu), PO Box 643113 WSU, Department of Mathematics, Pullman, WA 99164-3113, and **William Webb** and **Nathan Moyer**. *Discrete Optimization Models for the Number Partitioning Problem.*

The number partitioning problem (NPP) is to divide a set of positive integers $a_1, \ldots, a_n$ into two disjoint subsets such that the difference of the subset sums, called the discrepancy (Δ), is minimized. NPP is NP-complete, has a well-characterized phase transition, and finds applications in VLSI design, multiprocessor scheduling, cryptography etc. When $a_j = U[1, R]$ for some integer R, it is known that the optimal $\Delta = O(\sqrt{n}\, 2^{-n}\, R)$. The best known polynomial time approximation algorithm was proposed by Karmarkar and Karp (KK), and gives $\Delta_{KK} = O(n^{-0.72 \log n}\, R)$. We propose a mixed integer program (MIP) model for solving NPP. We consider a basis reduction-based reformulation of the MIP in order to handle the typically huge a_j's. We also consider direct application of basis reduction (BR) to NPP, similar to BR attacks on 0-1 knapsack problems, but on a *scaled* matrix to find near-optimal solutions (for large values of R, Δ is typically much bigger than 0). Finally, we consider various divide-and-conquer strategies, where smaller NPP sub-problems are solved to optimality, and their solutions are combined to obtain near-optimal solutions for the original NPP instance. (Received July 27, 2007)