1105-05-143 **Joshua Cooper*** (cooper@math.sc.edu) and **David Collins**. *Deducing vertex weights from empirical occupation times.*

Let G be a vertex-weighted digraph with marked "start" and "end" vertices. Suppose that a random walker begins at the start vertex, steps to neighbors of vertices with probability proportional to their weights, and stops upon reaching the end vertex. Can one deduce the weights from the paths that many such walkers take? An iterative numerical solution to this reconstruction problem is analyzed for when the empirical mean occupation times of the walkers is given. We show that a choice of weights that gives rise to a given list of proposed expected occupation times exists precisely when one of several equivalent conditions are satisfied, and give a quadratically convergent algorithm to compute it. (Received September 15, 2014)