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A ROBUST SPECTRAL METHOD FOR FINDING LUMPINGS AND META STABLE STATES OF NON-REVERSIBLE MARKOV CHAINS*

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Abstract. A spectral method for identifying lumping in large Markov chains is presented. The identification of meta stable states is treated as a special case. The method is based on the spectral analysis of a self-adjoint matrix that is a function of the original transition matrix. It is demonstrated that the technique is more robust than existing methods when applied to noisy non-reversible Markov chains.

Key words. Markov chain, stochastic matrix, metastable states, lumping, aggregation, modularity, block diagonal dominance, block stochastic

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