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Inverse spectral problems for mass-spring systems

This talk is about a Borg type inverse spectral problem for vibrating linear systems of point masses connected by springs. From the natural frequencies of vibration of the original system and a perturbation of it, we show how the masses and elastic coefficients of the springs can be reconstructed. To accomplish this, rank three perturbations of Jacobi matrices are considered and their associated Green's functions explicitly described in terms of spectral data. We give necessary and sufficient conditions for two given sets of points to be eigenvalues (natural frequencies) of the original and modified system respectively. This is joint work with Luis Silva and Mikhail Kudryavtsev.