Inverse Scattering Problems on Quantum Graphs

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I investigate inverse scattering problems for a Sturm-Liouvile operator on the metric graph consisting of a finite number of half-lines joined with either a loop or a finite number of finite intervals.
The scattering matrix, part of the negative eigenvalues and corresponding normalizing coefficients are taken as a scattering data.
The main goal of this research is to reconstruct the coefficients of Sturm-Liouvile operator on the basis of the given scattering data. We have deduced Marchenko equation which allowed us to prove the uniqueness theorems, provided a reconstruction procedure for the coefficients on the half-lines and investigated the conditional stability of the inverse scattering problem.
Later on I have used the asymptotic behaviour of the scattering matrix to investigate the geometry of the graph.