An algebraic procedure for the spectral corrections using the miss-distance functions in regular and singular Sturm-Liouville problems

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The subject matter of this talk is the numerical computation of the eigenvalues in a Sturm-Liouville problem (SLP) by the shooting technique and a corresponding spectral error correcting procedure based on the evaluation of the zeros of a suitable polynomial. This method generalizes the spectral correcting procedure obtained in [1] starting from a straight computation of the discretization error and an extension to the parallel shooting. It is strictly concerned with the different forms of the miss-distance function arising in the shooting algorithm for eigenvalues.

Two classes of problems are considered: the standard regular problems on a closed interval and the problems where an eigenvalue is non linearly involved and embedded in an essential spectrum giving origin to an inner singularity.

In both the considered cases, the effectiveness of the proposed method will be highlight by some numerical experiments.