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ON THE BASIS PROPERTIES OF STURM-LIOUVILLE PROBLEMS WITH DECREASING AFFINE BOUNDARY CONDITIONS

Abstract

We consider Sturm-Liouville problems with a boundary condition linearly dependent on the eigenparameter. We study the decreasing affine case where non-real or non-simple (multiple) eigenvalues are possible. We prove that the system of root (i.e. eigen and associated) functions of the corresponding operator, with arbitrary function removed, form a basis in $L_2(0,1)$, except some cases where this system is neither complete nor minimal. The method used is based on the determination of the explicit form of the biorthogonal system. For the basisness in L_2 we prove that the part of the system of root functions is quadratically close to sine or cosine systems. We also consider these basis properties in the context of general L_p. For this we use F. Riesz's theorem.