

1072-35-75

Daniela Lupo, Dario D. Monticelli and Kevin R. Payne* (kevin.payne@unimi.it),
Dipartimento di Matematica, Università di Milano, Via Saldini, 50, 20133 Milano, Italy. *Spectral
Theory for Linear Operators of Mixed Type and Applications to Nonlinear Dirichlet Problems.*

For a class of linear partial differential operators L of mixed elliptic-hyperbolic type in divergence form with homogeneous Dirichlet data on the entire boundary of suitable planar domains, we exploit the recent weak well-posedness result of Lupo-Morawetz-Payne [Comm. Pure Appl. Math. 2007] and minimax methods to establish a complete spectral theory in the context of weighted Lebesgue and Sobolev spaces. In particular, we find a basis for a weighted version of the space $H_0^1(\Omega)$ comprised of weak eigenfunctions which are orthogonal with respect to a natural bilinear form associated to L . The associated eigenvalues $\{\lambda_k\}_{k \in \mathbb{N}}$ are all non zero, have finite multiplicity and yield a doubly infinite sequence tending to $\pm\infty$. The solvability and spectral theory are then combined with topological methods of nonlinear analysis to establish the first results on existence, existence with uniqueness and bifurcation from $(\lambda_k, 0)$ for associated semilinear Dirichlet problems. The work to be presented is in collaboration with Daniela Lupo (Politecnico di Milano) and Dario Monticelli (Università di Milano). (Received June 19, 2011)