Hiroshima Mathematical Analysis Seminar No.160

Ruy Coimbra Charão   Federal University of Santa Catarina

Spectral properties of a coupled system of Schrödinger equations
with time-periodic coefficients

We consider a coupled system of Schrödinger equations with time-periodic
coefficients,

$$i\,u_t = -\Delta u + V(x,t)u + g(x,t)v$$
$$i\,v_t = -\Delta v + W(x,t)v + g(x,t)u$$

on the Hilbert space $\mathcal{H} = L^2(\mathbb{R}^n) \times L^2(\mathbb{R}^n)$, where g, V and W are periodic
time-dependent potentials, with period T. We denote by $(U(t,s))_{(t,s)\in\mathbb{R}\times\mathbb{R}}$ its
associated propagator. The study of the spectrum of the so called Floquet
operator $U \equiv U(T,0)$ is relevant for the asymptotic behavior of the solutions
$U(t,0)\varphi$. By using a multiplier method we establish the absence of regular
eigenvectors of the Floquet operator $U(T,0)$.

[1] M. A. Astaburuaga, O. Bourget, V. H. Cortés, C. Fernández, *Floquet operators without singular continuous spectrum*, J. Funct. Anal. **238** (2006), 489–517.

[2] R. Lavine, *Commutators and scattering theory I, Repulsive interactions*, Comm. Math. Phys. **20** (1971), 301–323. *Commutators and scattering theory II, A class of one-body problems*, Indiana Univ. Math. J. **21** (1972), 643-656.

[3] K. Yokoyama, *Mourre theory for time-periodic systems*, Nagoya Math. J. **149** (1998), 193–210.

Cleverson Roberto da Luz   Federal University of Santa Catarina

Uniform decay rates of anisotropic electromagnetic/elasticity models

A coupled semilinear system of dynamic hyperbolic equations in electromagnetic/elasticity in three-dimensional domains is considered. Anisotropic Maxwell equations are very special: The energy in general does not propagate along the normals to the fronts but along rays which are distinct from the normals. Thus, in these kinds of mediums the so-called permittivity and permeability are no more scalar-valued functions but 3×3 symmetric matrices. In this talk we show decay rates of the total energy of the coupled anisotropic system provided mild dissipative effects are present. In exterior domains our main result says that in the presence of nonlinear damping, a unique solution of small initial data exists globally in time and the total energy as well as higher order energies decay at an uniform rate. In case of bounded domains the energy associated with the model decays exponentially.

ikehatar@hiroshima-u.ac.jp
naoyuki@hiroshima-u.ac.jp
isamu_o@math.sci.hiroshima-u.ac.jp
kawasita@math.sci.hiroshima-u.ac.jp
kura@math.sci.hiroshima-u.ac.jp
sasakiyo@hiroshima-u.ac.jp
takimoto@math.sci.hiroshima-u.ac.jp
mats@math.sci.hiroshima-u.ac.jp

★

★