# ASYMPTOTIC PROPERTIES FOR THE SPECTRUM OF SEMIREGULAR GLOBAL SYSTEMS

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Abstract

In this talk I present some recent results about spectral analysis of systems of PDEs related also with quantum physics models. Namely, it is stated a Weyl asymptotic for a class of systems containing certain quantum optics models such as the Jaynes-Cummings model and the Rabi one, but also models of geometric differential complexes over $\mathbb{R}^n$. In more detail, it is provided the asymptotics of the Weyl spectral counting functions in terms of the principal, semiprincipal and subprincipal symbols of the system. Moreover, a quasi-clustering result for this class of positive systems is given. In fact, we show the eigenvalues of this kind of systems can be located in the union of intervals having centers determined by the matrix invariants of the semiprincipal and subprincipal symbol and width decreasing as the centers go to $+\infty$. Finally, a meromorphic continuation of the spectral zeta function for semiregular Non-Commutative Harmonic Oscillators (NCHO) is given. By "semiregular system" we mean a pseudodifferential systems with a step $-j$ in the homogeneity of the $jth$-term in the asymptotic expansion of the symbol.
The aforementioned results were obtained jointly with Alberto Parmeggiani.