



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

M. E. Taylor Analysis and PDE Seminar

Wednesday, October 30th
3:30 - 4:30 p.m.
Phillips Hall 385

Wave phenomena in deformed square lattice media

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Abstract. The dynamics of waves in periodic media are determined by the band structure of the relevant Hamiltonian operator; degenerate points within the band structure may give rise to novel wave dynamics behavior. In this talk, I will first give a brief introduction to band (i.e. Floquet-Bloch) theory. I will then present results concerning the band structure degeneracies associated with infinite "bulk" media possessing the symmetries of a square lattice, and small linear deformations of such media. Wavepackets spectrally supported near such degeneracies exhibit unique dynamical behavior as determined by their local character, which is constrained by the symmetries of the medium. Finally, I will discuss similar systems which contain an unbounded line defect, or "edge". In this setting, one seeks special eigenstates which propagate along the edge but remain localized transverse to it. The band structure degeneracies of essentially bulk media far from the edge play a key role in the construction of such edge states, and contain topological information related to the edge state family via a bulk-edge correspondence principle. This is ongoing joint work with Jeremy Marzuola and Michael Weinstein.