1035-34-1468　　　　**Jared C Bronski*** (`jared@math.uiuc.edu`), 1409 W Green St, Urbana, IL 61801, and **Zoi Rapti**.
Defect Eigenvalues and Diophantine Equations via the Evan's function. Preliminary report.

We consider the problem of a periodic medium with a single compactly supported defect potential. We develop a winding number argument that allows us to count the number of defect eigenvalues in a particular gap in the spectrum of the periodic problem. This count can differ from the true number of eigenvalues by at most one, and is frequently exact. In the limit of large gap number we compute the asymptotics of the number of eigenvalues. For sufficiently large gap number there is exactly one eigenvalue unless a certain Diophantine approximation problem admits solutions, in which case there may be zero, one or two eigenvalues. (Received September 19, 2007)