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Frelinghuysen Road, Piscataway, NJ 08854-8019. *Imaging of local defects in unknown periodic
layers.*

Nondestructive testing of period media is an important problem with grown interest since periodic material are part of many fascinating engineering structures with many technological use such as nanoglass. In many situation the periodicity of the healthy periodic material is complicated or difficult to model mathematically, hence computing its Green's function is computationally expensive or even impossible. This work is concerned by the analysis of so-called differential linear sampling method to reconstruct the support of perturbations without using the Green's function of the periodic layer nor reconstruct the periodic background. We use measurements of scattered waves at a fixed frequency. The justification of this method relies on the well-posedness of a nonstandard interior transmission problem, which until now was an open problem except for the special case when the local perturbation didn't intersect the background inhomogeneities. The analysis of this new interior transmission problem is the main focus of this talk. We then outline the principles and the justification of our inversion method and present some numerical examples that confirm the theoretical behavior of the differential indicator function determining the reconstructable regions in the periodic layer. (Received August 14, 2018)