1172-35-39   **Dinh-Liem Nguyen** (`dlnguyen@ksu.edu`), **Trung T. Truong*** (`trungt@k-state.edu`) and **Colin L. Williams** (`colinlee@ksu.edu`). *Inverse Born series method for a periodic inverse scattering problem.*

Periodic inverse scattering problems have attracted an increasing amount of attention during the past few decades due to their applications in the study of photonic crystals. These problems are known to be non-linear and severely ill-posed. There have been several different approaches to tackle both shape reconstruction and material parameter reconstruction problems. The latter often requires advanced a priori information about the solution, for example, optimization-based methods need a good initial guess. Inverse Born series, on the other hand, is a direct method for reconstructing the material parameter with an analysis that can be rigorously justified under certain conditions. Numerical reconstructions also show high levels of accuracy and stability. This talk focuses on the analysis of the Forward and Inverse Born series as well as their modified versions to solve the periodic inverse scattering problem. Corresponding numerical results will also be presented. This is joint work with Dinh-Liem Nguyen and Colin Williams. (Received August 10, 2021)