NONREFLECTING CORNER CONDITIONS FOR 2D TIME-INDEPENDENT SCHRÖDINGER EQUATION

Heejae HAN [1] , Dalhyeon GWON [1] , Hanchul KIM [2] and Myungjoo KANG [1]

1) *Department of Mathematical Sciences, Seoul National University, Seoul 151-747, KOREA*

2) *Department of Nanophysics, Sookmyung Women's University, Seoul, 140-742, KOREA*

Corresponding Author : Heejae HAN, hhj5575@gmail.com

ABSTRACT

When solving partial differential equations on unbounded domains numerically, we define a bounded computational domain where the solution exhibits meaningful behavior. This truncation requires the artificial boundary condition which should be appropriate for the physical phenomena. Undesired reflection could occur without suitable artificial boundary condtions. For the half plane, this situation is easily remedied. In case of rectangular domain, however, requires additional corner conditions to aviod reflections at the corner. We propose a corner condition to solve a 2D time-independent Schrodinger equation on a rectangular domain.

REFERENCES

1. X. ANTOINE, A. ARNOLD, C. BESSE, M. EHRHARDT and A. SCHÄDLE, " A review of transparent and artificial boundary conditions techniques for linear and nonlinear Schrdinger equations", *Commun. Comput. Phys.*, 2008.
2. F. COLLINO, "High order absorbing boundary conditions for wave propagation models: straight line boundary and corner cases", *Second International Conference on Mathematical and Numerical Aspects of Wave Propagation (Newark, DE, 1993)*, 1993, pp. 161-171.
3. B. ENGQUIST and A. MAJDA, "Absorbing boundary conditions for numerical simulation of waves", *Proceedings of the National Academy of Sciences*, Vol. 74, 1977, pp. 1765-1766. 1988, pp. 141-155.
4. B. ENGQUIST and A. MAJDA, "Absorbing boundary conditions for numerical simulation of waves", *American Mathematical Society*, Vol. 31, 1977, pp. 629-651.
5. D. GIVOLI, "High-order local non-reflecting boundary conditions: a review", *Wave Motion*, Vol. 39, 2004, pp. 319-326.
6. C. A. MOYER, "Numerov extension of transparent boundary conditions for the Schrdinger equation in one dimension", *American Journal of Physics*, Vol. 72, 2004, pp. 351-358.