

# Study of Radial Basis Collocation Method for Wave Propagation

Lihua Wang<sup>1</sup>, Zheng Zhong, Fuyun Chu

*School of Aerospace Engineering and Applied Mechanics, Tongji University,  
Shanghai, 200092, P.R.China.*

---

## **Abstract**

A numerical method based on radial basis functions and collocation method is proposed for wave propagation. Standard collocation and weighted boundary collocation approaches yield significant errors in wave problems. Therefore, a new method based on explicit time integration scheme that can correct the inaccuracy in the solutions and the errors accumulated in time integration is developed. This method can be easily applied for low and high dimensional wave problems. The stability conditions are obtained and the relationships between control parameters and stability are evaluated. Requirement of collocation points in numerical dispersion is studied and nondispersion condition is formulated. Eigenvalue analysis is investigated to evaluate the effectiveness of radial basis collocation method for solving wave problems. Eigenvalue study with and without imposing the boundary conditions are compared. The influences of shape parameters and distribution of collocation points and source points are presented. Numerical examples are simulated to examine and validate the proposed method.

---

<sup>1</sup> Corresponding author, E-mail address: [lhwang@tongji.edu.cn](mailto:lhwang@tongji.edu.cn)