*ICCES, 2024 vol. 25, no.4*
DOI: 10.32604/icces.2023.09264

**PROCEEDINGS**

# Peridynamic Analysis on Thermal-Elastic Deformation of Isotropic Plate with Traction Boundary Condition

**Ming Yu[1], Zeyuan Zhou[1] and Zaixing Huang[1,*]**

[1] State Key Laboratory of Mechanics and Control of Mechanical Structures, Nanjing University of Aeronautics and Astronautics 29 Yudao Street, Nanjing, 210016, China

[*]Corresponding Author: Zaixing Huang. Email: huangzx@nuaa.edu.cn

**ABSTRACT**

How to well characterize traction boundary condition is always a difficult problem in peridynamics. In order to solve this problem, an integral term of boundary traction weighted by a tensor-typical transfer function is added to the original peridynamic motion equation, to form the so-called the traction-associated peridynamic motion equation. The traction-associated peridynamic motion equation is proved to be compatible with the conservation laws of linear and angular momentum. The conservation law of energy is also verified to have the same form as the original peridynamics advanced by Silling. Therefore, the constitutive models in the original peridynamics can be directly applied to the traction-associated peridynamic motion equation. By the inverse method, the transfer function matching with the classical elasticity analytical solution of rod subjected to uniaxial tension and thermal expansion is determined for bond-based constitutive equation, and is directly extended to solve 2-dimensional thermal-elastic problems. The numerical solution of isotropic plate subjected to uniaxial tension and thermal expansion is given, and compared with the classical elasticity analytical solution. The results show that the traction-associated peridynamic motion equation does not require the volume correction and the surface correction, and it not only retains all advantages of the original peridynamics, but also can conveniently deal with the complex traction boundary conditions.

**KEYWORDS**

Traction-associated peridynamic motion equation; traction boundary condition; bond-based constitutive model; thermal-elastic

**Funding Statement:** The authors received no specific funding for this study.

**Conflicts of Interest:** The authors declare that they have no conflicts of interest to report regarding the present study.