Evaluation of Dynamic Stress Intensity Factors Using Varying Horizon Size in Ordinary State-Based Peridynamics

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Abstract: The J-integral and the interaction integral method are employing for evaluating dynamics stress intensity factor, in ordinary state-based peridynamics. The governing equation of peridynamics is based on internal force that defined by particles interact each other over finite distances. The interaction each particle needs to be satisfied the newton third law. A lot of particles are required for getting high accuracy in peridynamic modeling. Therefore, it is required the efficient modeling such as local meshing in finite element modeling. However, when arrangement of particle with varying particle size and horizon sizes are locally used, the standard peridynamic equation is not satisfied the newton third law. To overcome this problem, Dual-horizon peridynamic modeling is employing in this study. Several particle arrangements with varying horizon size are analyzed and the errors that caused by using varying horizon are investigated in basic problem. peridynamic modeling is proposed for getting high accuracy in Dual-horizon peridynamics, by introducing the concept that the horizon size changes smoothly. In addition, the graph partitioning is employing for parallel computing. The cracked plate is analyzed. Efficient computing is carried out and high accuracy dynamic stress intensity factors are obtained in proposed modeling. The path-independent is also examined.

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