

**PROCEEDINGS**

## **A Second-Order Multiscale Fracture Model for the Brittle Materials with Periodic Distribution of Micro-Cracks**

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### **ABSTRACT**

An effective fracture model is established for the brittle materials with periodic distribution of micro-cracks using the second-order multiscale asymptotic methods. The main features of the model are: (i) the second-order strain gradient included in the fracture criterions and (ii) the strain energy and the Griffith criterions for micro-crack extensions established by the multiscale asymptotic expansions. Finally, the accuracy of the presented model is verified by the experiment data and some typical fracture problems. These results illustrate that the second-order fracture model is effective for analyzing the brittle materials with periodic distribution of micro-cracks.

### **KEYWORDS**

Second-order strain gradient; Griffith criterion; asymptotic homogenization; brittle fracture

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