



Lecture Notes in Mechanical Engineering

Muhammad Yusri Ismail

Mohd Shahrir Mohd Sani

Sudhakar Kumarasamy

Mohd Adnin Hamidi

Mohd Shamil Shaari *Editors*


# Technological Advancement in Mechanical and Automotive Engineering

Proceeding of International  
Conference in Mechanical Engineering  
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# Lecture Notes in Mechanical Engineering

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Editors

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*Editors*

Muhammad Yusri Ismail  
Faculty of Mechanical and Automotive  
Engineering Technology (FTKMA)  
Universiti Malaysia Pahang  
Pekan, Malaysia

Mohd Shahrir Mohd Sani  
Faculty of Mechanical and Automotive  
Engineering Technology (FTKMA)  
Universiti Malaysia Pahang  
Pekan, Malaysia

Sudhakar Kumarasamy  
Faculty of Mechanical and Automotive  
Engineering Technology (FTKMA)  
Universiti Malaysia Pahang  
Pekan, Malaysia

Mohd Adnin Hamidi  
Faculty of Mechanical and Automotive  
Engineering Technology (FTKMA)  
Universiti Malaysia Pahang  
Pekan, Malaysia

Mohd Shamil Shaari  
Faculty of Mechanical and Automotive  
Engineering Technology (FTKMA)  
Universiti Malaysia Pahang  
Pekan, Malaysia

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# Preface

It is our great pleasure to present the compilation of Proceedings of International Conference in Mechanical Engineering Research (ICMER 2021). The 6th conference in mechanical engineering research is hosted by Faculty of Mechanical and Automotive Engineering Technology (FTKMA) in collaboration with Ningxia University of China, Universiti Teknologi Malaysia (UTM), UCSI University and the University of Mindanao.

ICMER 2021 is a scientific forum of discussion for scientists, researchers and engineers from all over the world to exchange ideas and the research results in the field of automotive technology, advanced fluid, advanced material, energy management and advanced manufacturing.

This conference is the first conference in the history of international conference in mechanical engineering research conducted in virtual through online platform due to the COVID-19 pandemic that hits across the globe. Therefore, we would like to express our sincere appreciation and gratitude to the committee members, co-organizer and reviewers to make this conference successful.

Last but not least, we would like to thank the keynote speakers and participants who contributed their knowledge to this prestigious conference.

Pekan, Malaysia

Muhammad Yusri Ismail  
Corresponding Editor

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## **Effect of particle discretization and horizon size on the displacement and damage plot using bond-based peridynamics**

*H. N. Yakin, N. Nikabdullah and M. R. M. Rejab*

Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang,  
26600 Pekan, Pahang, Malaysia

E-mail: [nikabdullah@ump.edu.my](mailto:nikabdullah@ump.edu.my)

### **ABSTRACT**

Peridynamics (PD) represents a new non-local theory of continuum mechanics which uses integro differential equations instead of the typical local partial differential equations in its formulation. Thus, it is suitable for modelling fracture mechanics, where a continuum domain is modelled through particles connected via physical interactions. The PD formulation allows us to model spontaneous crack initiation, and crack branching without the need for special mathematical treatment. The value of parameters such as particle discretization and horizon size will be checked to make sure that it agreed to the result from FEM in elastic deformation before proceed to the failure mode. In PD, failure criterion is established when its stretch value exceeds a prescribed critical stretch value. In the classical bond model or Prototype Microelastic Brittle (PMB), the bond force grows linearly with the bond stretch, and the value suddenly goes down to zero when the bond stretch exceeds its critical value. This study will focus on the effect of horizon size and particle discretization on PD displacement of elastic analysis, and damage patterns with PMB damage model. The proposed study leads to a better understanding of how horizon size and particle discretisation affect the damage patterns in PD frameworks.

### **KEYWORDS**

Cracks; Peridynamics; Prototype microelastic brittle

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