

# NUMERICAL STUDY ON INTERFACIAL PROPERTIES OF ADVANCED COMPOSITES

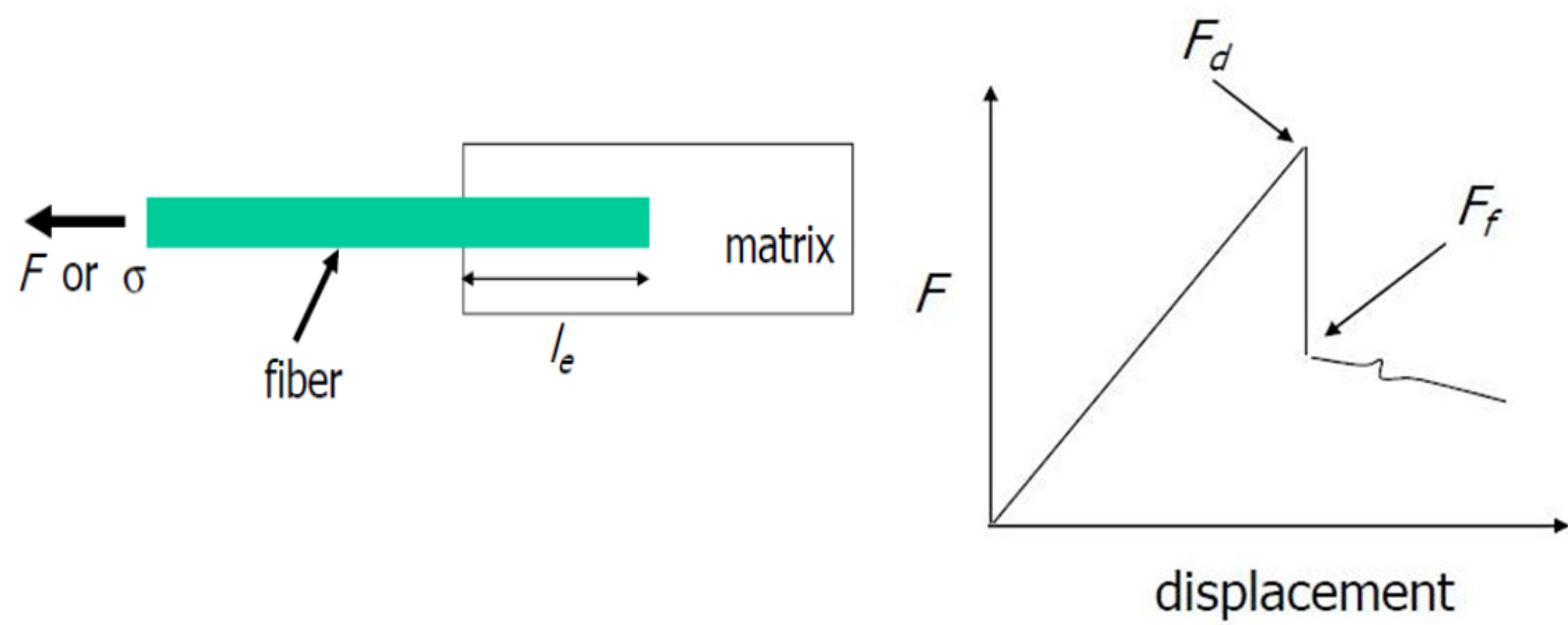
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## Objective

The properties of interface between the fibre and matrix often influence significantly the composite performance in all types of composites. The aim of this research is to investigate the interfacial properties of various advanced composites, including carbon fibre-epoxy composites, carbon nanotube (CNT)-epoxy and, CNT-hybridized carbon fibre (CNT/CF) composites.

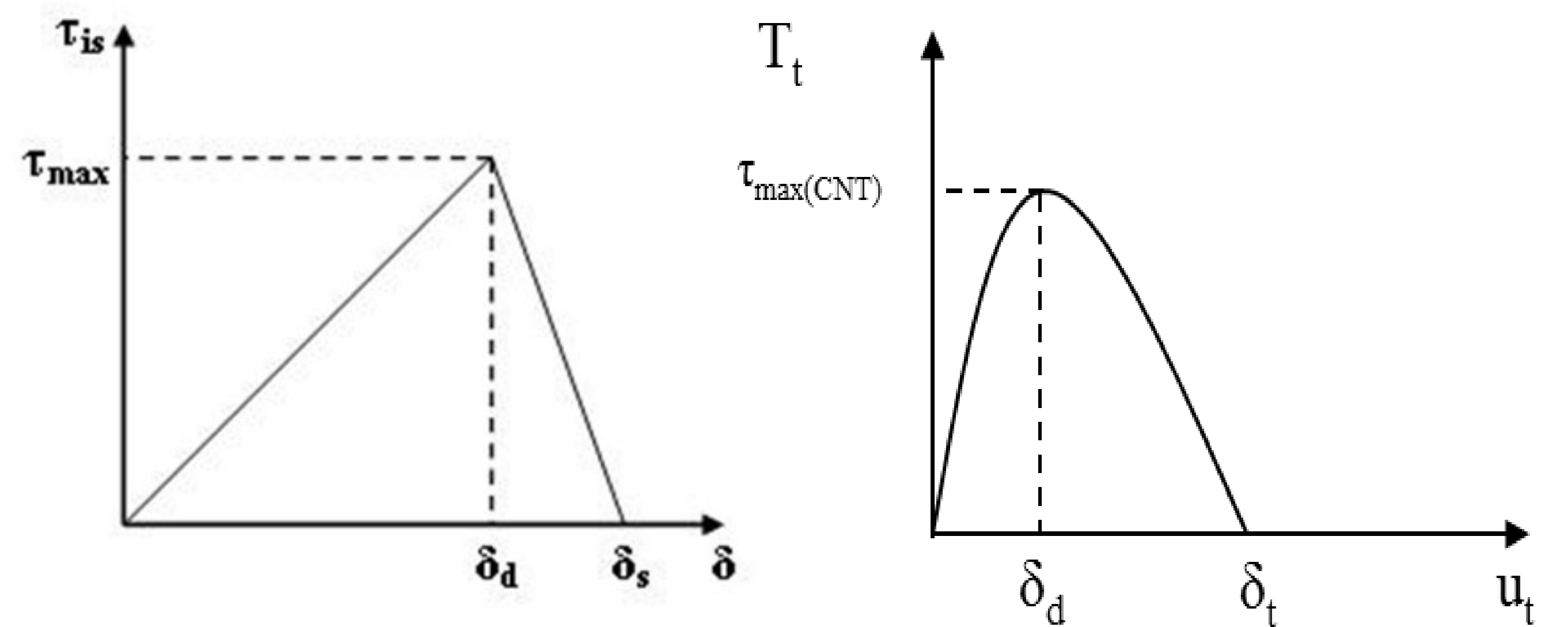
### Pullout Test

Three stages: elastic deformation stage, debonding stage and sliding stage.



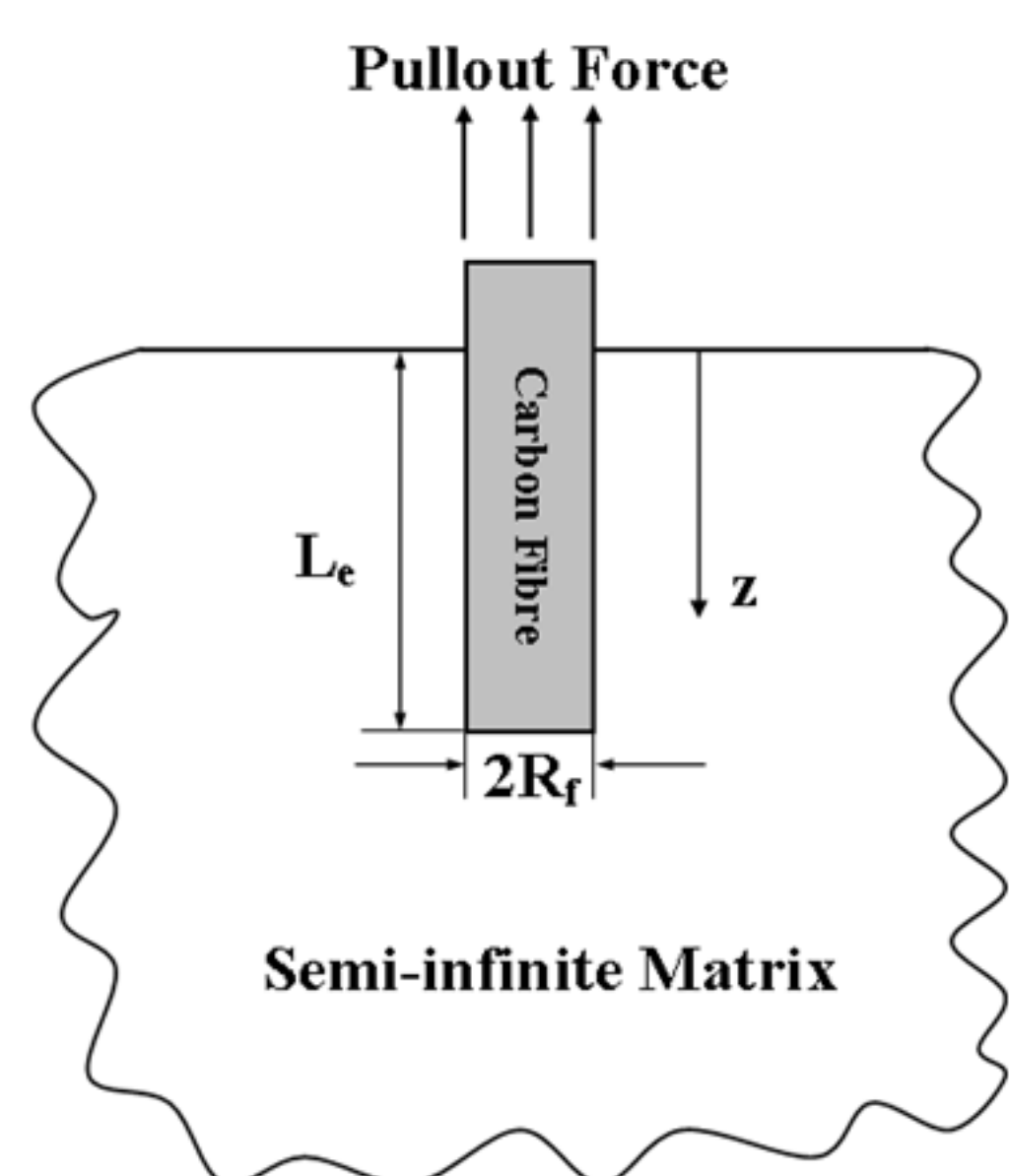
### Cohesive Zone Model

Establishes traction-separation relation for the interface.

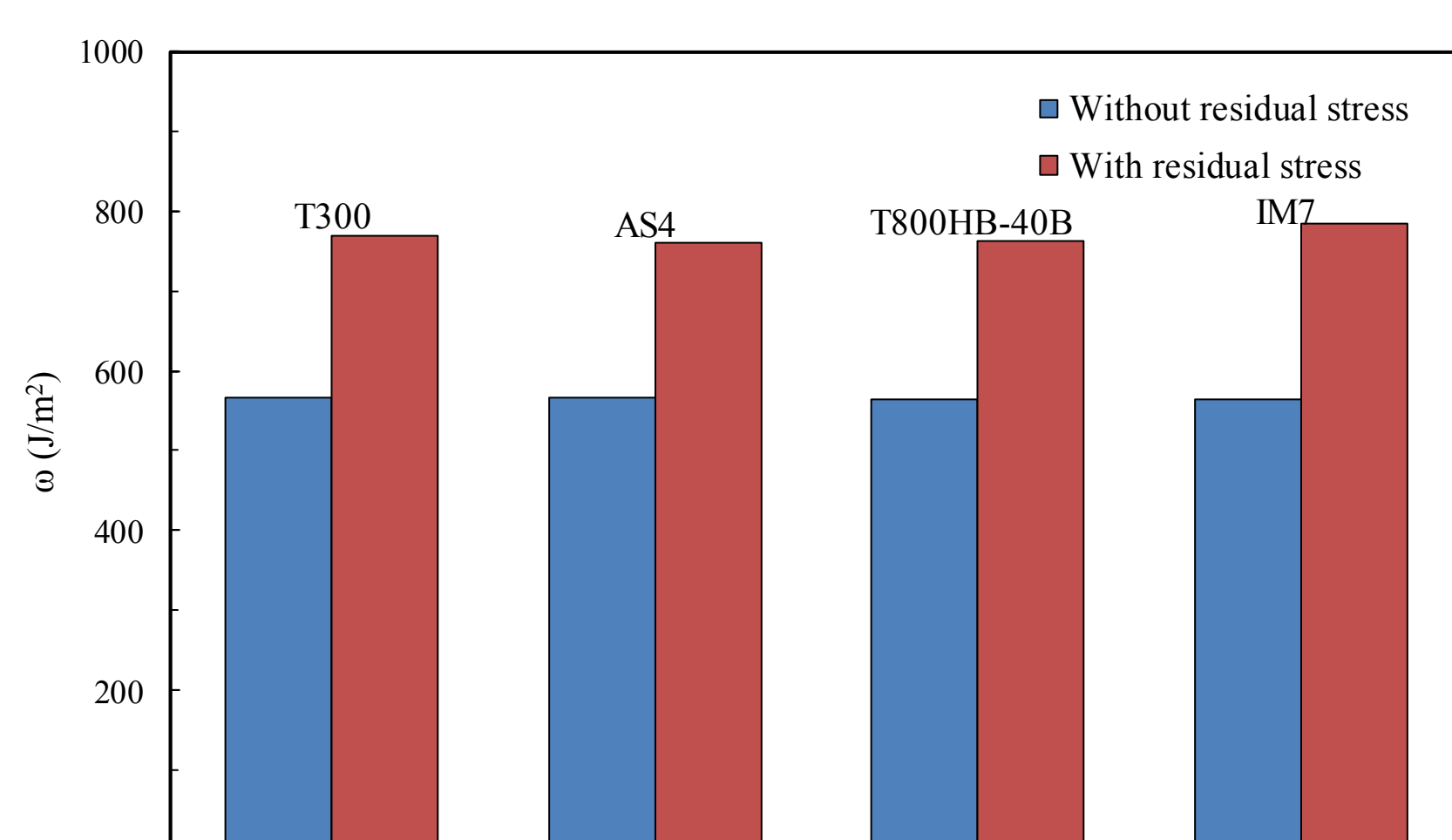
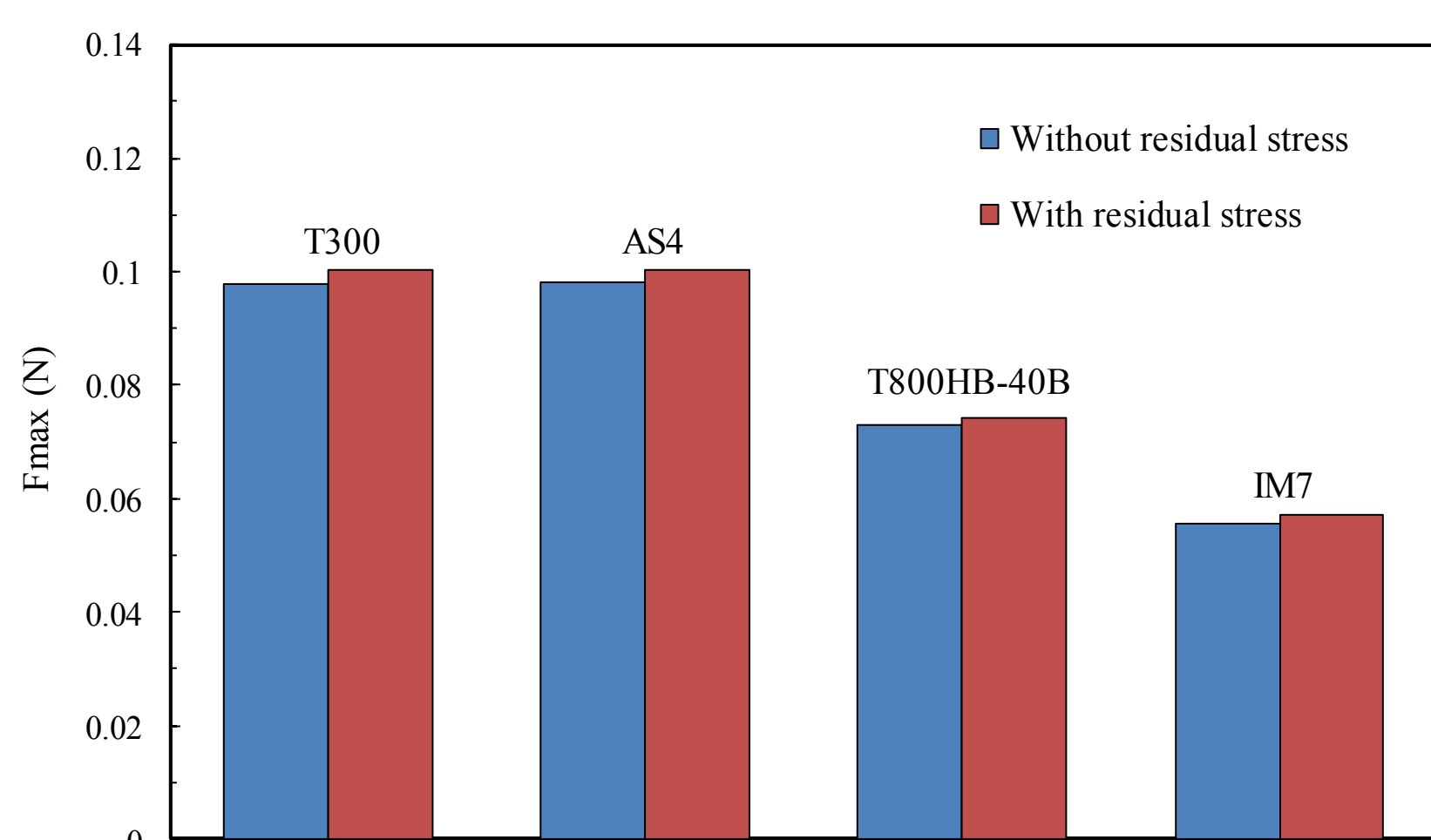


## Three Numerical Models and Results

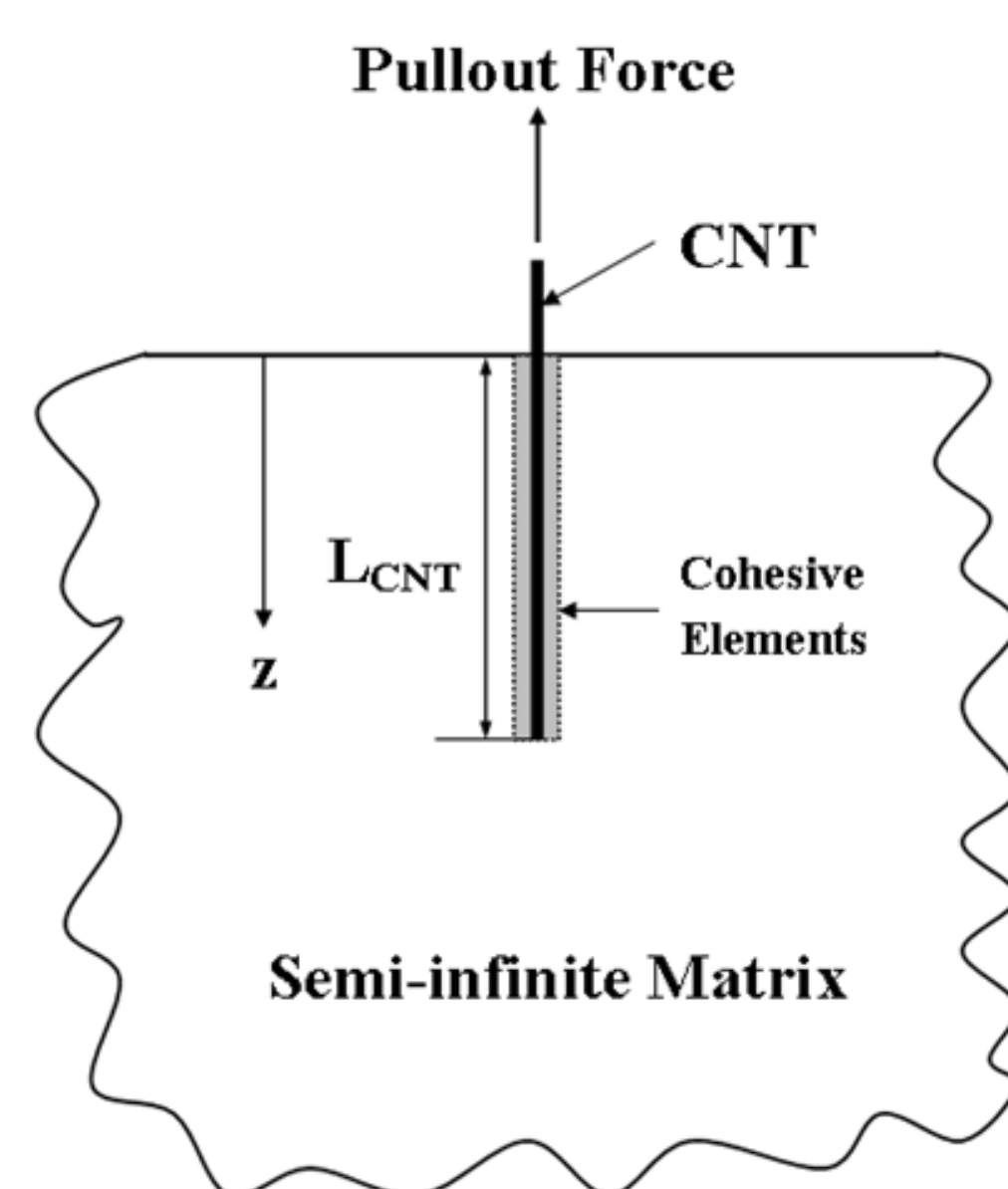
### Single Carbon Fibre



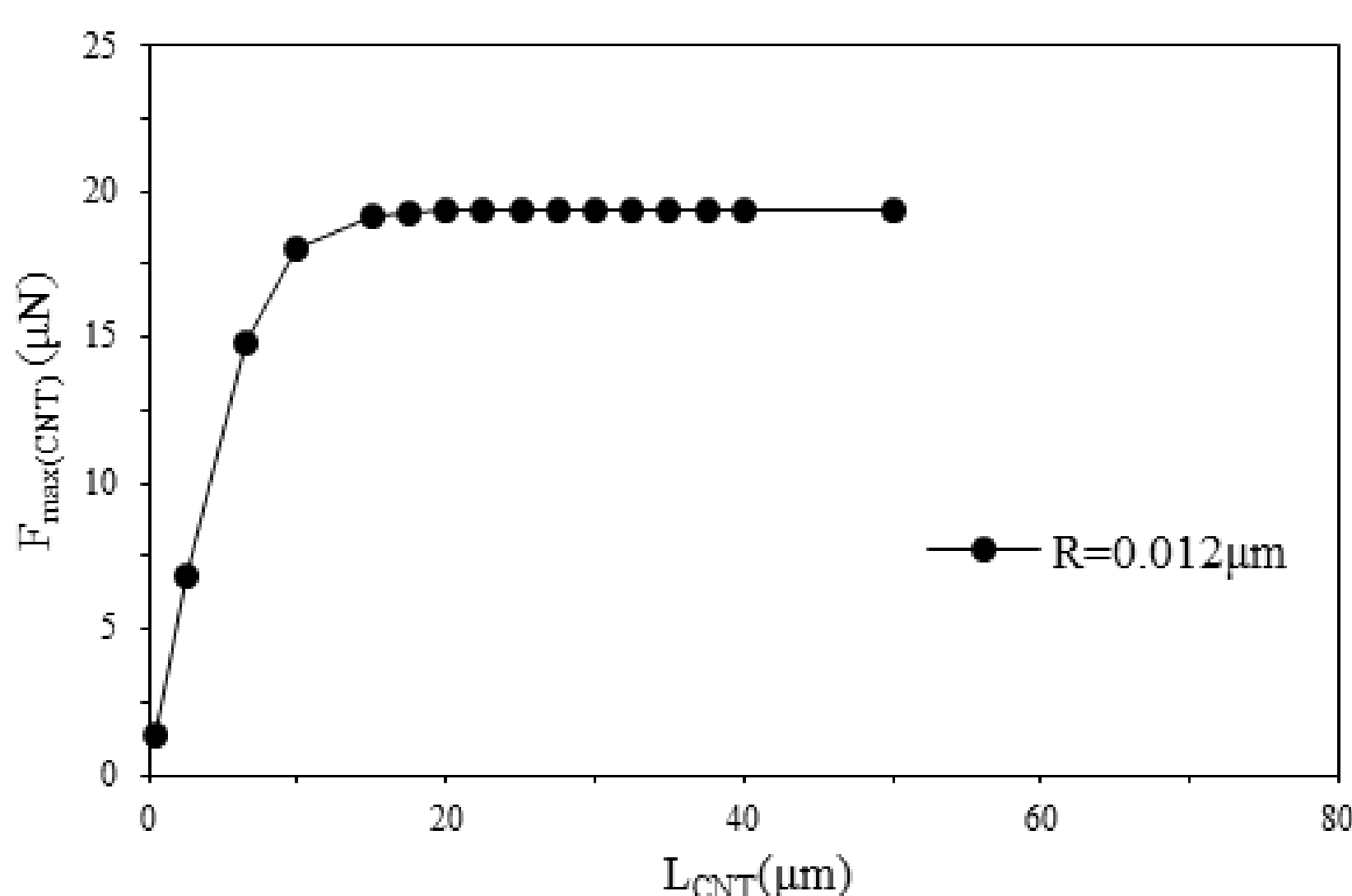
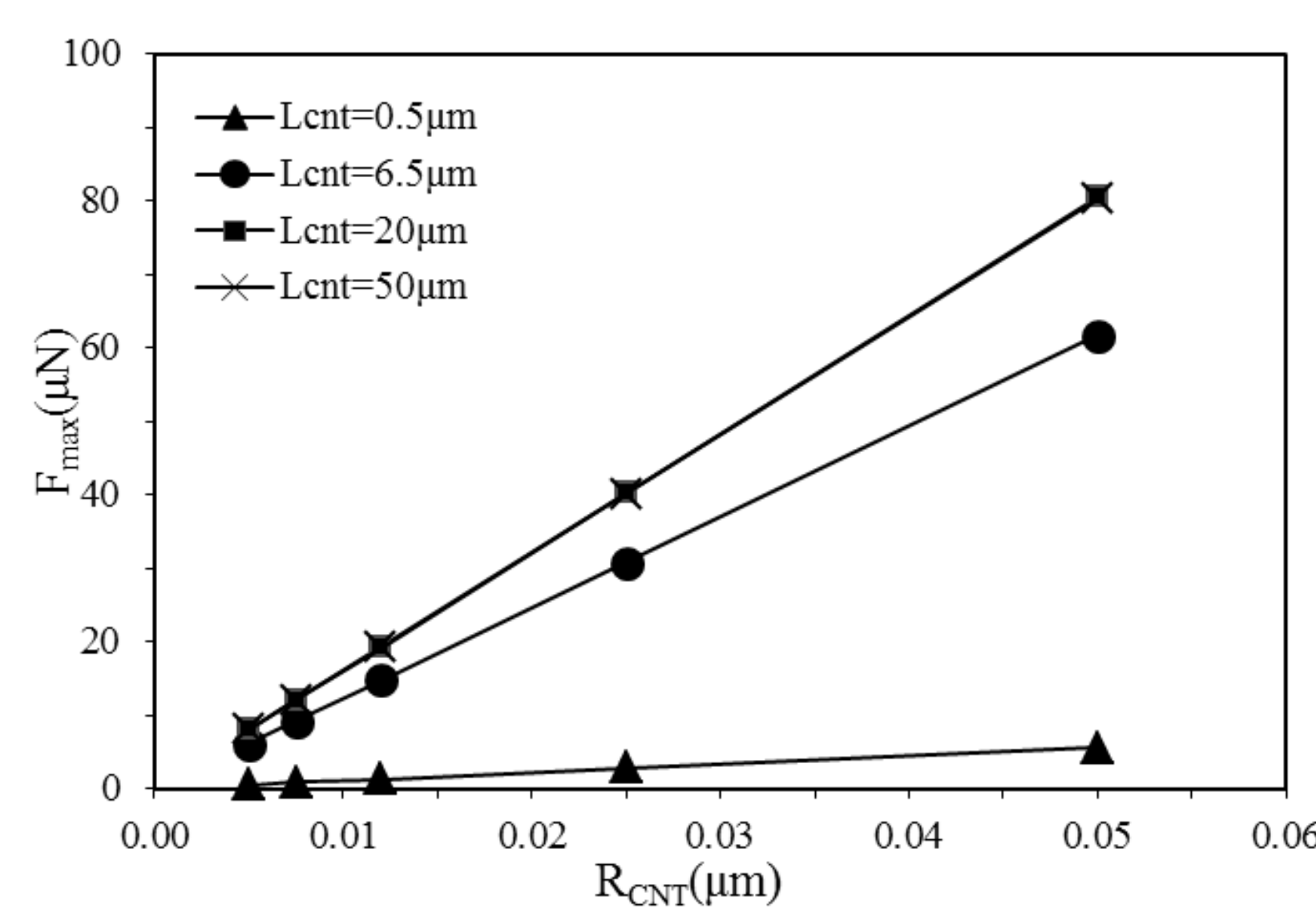
- Influence of the residual thermal stress is insignificant on the debonding force.
- Influence of the residual stresses on the specific pullout energy is significant.



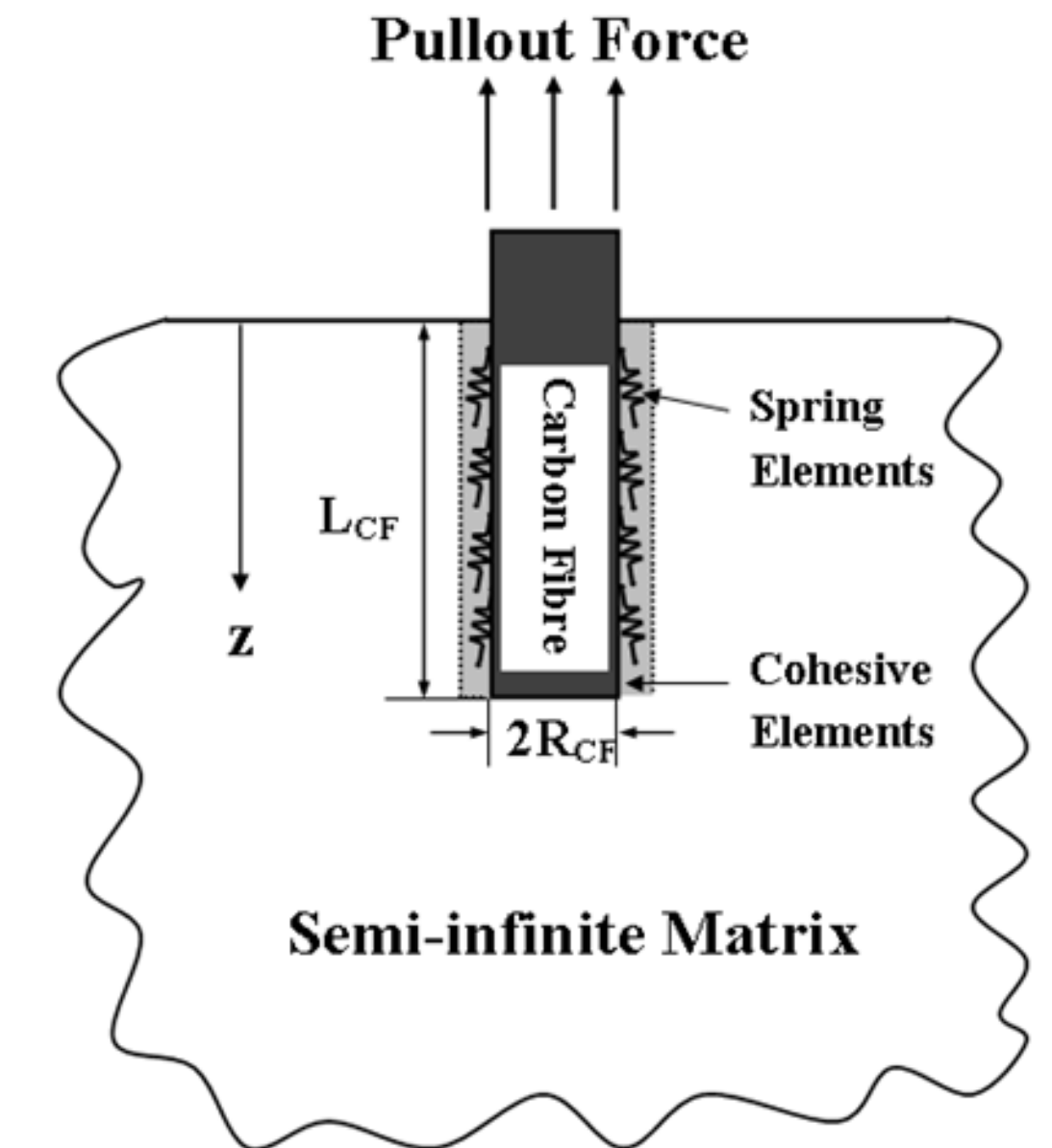
### Single CNT



- Debonding force increases with increases of CNT radius;
- Debonding force can reach to a saturated value at a critical embedded length of CNT.



### Single CNT-Hybridized Carbon Fibre



- Apparent interfacial shear strength increases with increases in both the CNT embedded length and the CNT radius;
- Increasing the size of CNTs can enhance the fibre bridging effect.

