



Curriculum Vitae

• Personal Data •

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• Objective •

Application for a postdoctoral position in Solid Mechanics

• Education •

Ph.D. in *Solid Mechanics*, Beihang University...09/2011~06/2016

Thesis: Finite element analysis and molecular dynamics simulation of the static and dynamic properties of the interpenetrating phase composites

Supervisor: Prof. Zixing Lu

B.E. in *Engineering Mechanics*, Beihang University.....09/2007~06/2011

Thesis: Models and applications of low density porous materials

• Publications •

Journals:

***Notice:** I am the main contributor to the papers in which my advisor Prof. Zixing Lu is the first author.

- [1] **Fan Xie**, Zixing Lu, Zhenyu Yang, Wenjun Hu. Mechanical behaviors and molecular deformation mechanisms of polymers under high speed shock compression: A molecular dynamics simulation study. *Polymer*, 2016 98: 294–304.
- [2] **Fan Xie**, Zixing Lu, Zeshuai Yuan. Numerical analysis of elastic and elastoplastic behavior of interpenetrating phase composites. *Computational Materials Science*, 2015, 97:94-101.
- [3] Zixing Lu, **Fan Xie***, Qiang Liu, et al. Surface effects on mechanical behavior of elastic nanoporous materials under high strain. *Applied Mathematics and Mechanics*, 2015, 36(7):927-938.
- [4] Zixing Lu, **Fan Xie***, Jianyue Wang. Theoretical prediction of elastic modulus of interpenetrating phase composites with open-cell foam skeleton. *Acta Materiae Compositae*, 2014, 31(5):1330-1336. (In Chinese)
- [5] Zixing Lu, Xiang Li, Zhenyu Yang, **Fan Xie**. Novel structure with negative Poisson's ratio and enhanced Young's modulus. *Composite Structures*, 2015, 138: 243-252.
- [6] Zixing Lu, Zeshuai Yuan, Qiang Liu, Zijun Hu, **Fan Xie**, Man Zhu. Multi-scale simulation of the tensile properties of fiber-reinforced silica aerogel composites. *Materials Science and Engineering: A*, 2015, 625:278-287.
- [7] Zeshuai Yuan, Zixing Lu, Mingyang Chen, Zhenyu Yang, **Fan Xie**. Interfacial properties of carboxylic acid functionalized CNT/polyethylene composites: A molecular dynamics simulation study. *Applied Surface Science*, 2015, 351:1043-1052.
- [8] Zixing Lu, Lianbang Cui, Zeshuai Yuan, Zhenyu Yang, **Fan Xie**. Numerical analysis of the elastic-plastic properties of the composites incorporating nanohybrid shish-kebab structures.

Computational Materials Science, 2015, 109:56-65.

- [9] Zeshuai Yuan, Zixing Lu, Mingyang Chen, Zhenyu Yang, **Fan Xie**. A criterion for the normal properties of graphene/polymer interface. *Computational Materials Science*, 2016, 120:13–20.

Conferences:

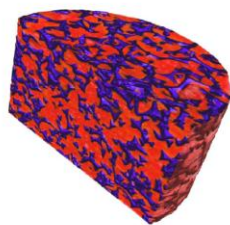
- [10] **Fan Xie**, Zixing Lu. Shock wave propagation in polyethylene via molecular dynamics simulation. *International Conference on Composites and Nano-engineering*, 2015. (Oral presentation)
- [11] **Fan Xie**, Zixing Lu. Finite element analysis of thermo-mechanical behavior of IPC. *Chinese Congress of Theoretical and Applied Mechanics*, 2015. (In Chinese) (Oral presentation)

• Research Experience •

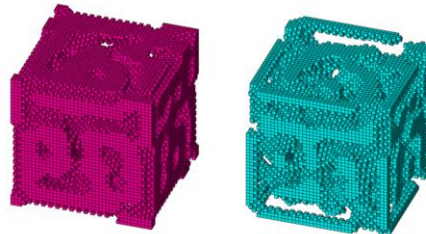
FEM simulation and theoretical study on Interpenetrating phase composites

The project is supported by the National Natural Science Foundation for young scientists of China. (NSFC, 10932001).

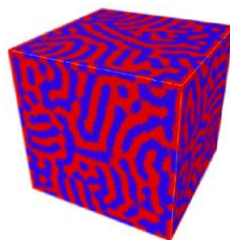
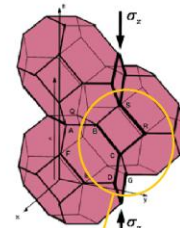
- ✧ Overall responsible for the project planning, theoretical derivation, numerical implementation and the final report writing, led a group of a doctoral student and two master students.
- ✧ Developed a 3D random finite element (FE) model to characterize the interpenetrating phase composite (IPC) based on the phase field method using an in-house FORTRAN code.
- ✧ Elastic and elastoplastic behaviors of IPC were studied using APDL in ANSYS and compared with experimental data.
- ✧ Developed a mechanical model with elastic foundation beam theory to predict the formula of elastic modulus of IPC theoretically.
- ✧ Current achievements: 3 papers published.



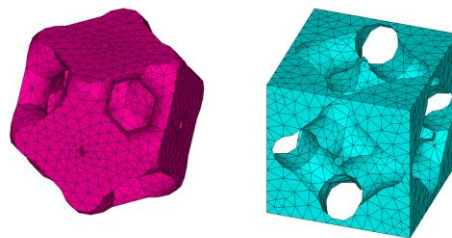
X-ray CT scan



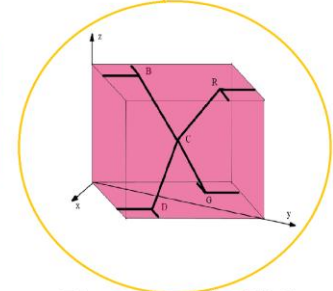
3D Random model



Phase field method



Kelvin model



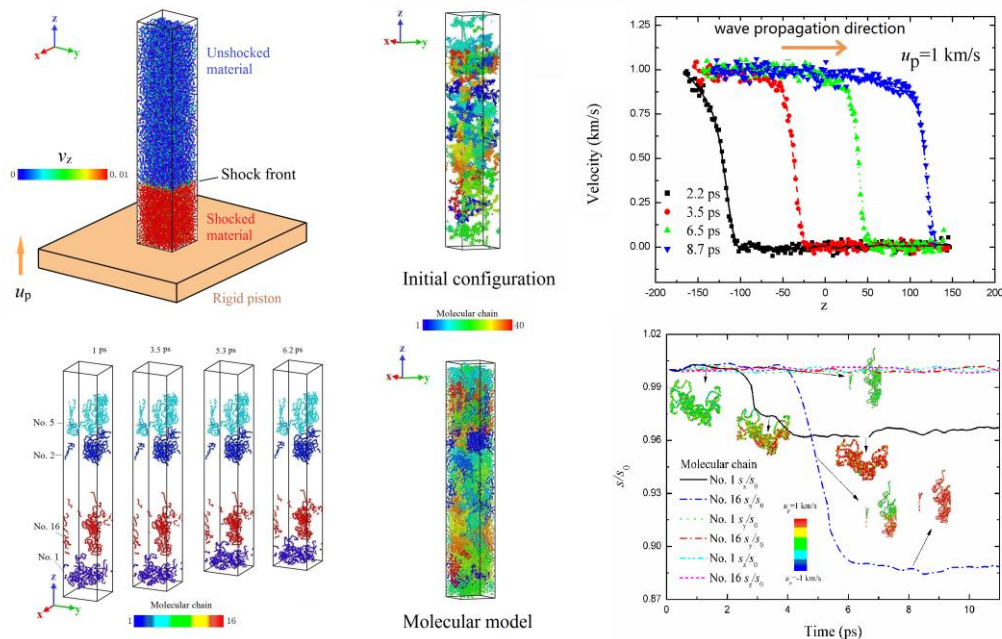
Theory model of IPC

Investigations on disperse wave in viscoelastic polymer via Molecular dynamics simulation

The project is supported by a research institute of China.

- ✧ Overall responsible for the project planning, numerical simulation and the final report writing, led a group of two master students.

- ◇ Molecular dynamics simulation (MDs) based on a united atom (UA) approach was performed to analyze the mechanical behaviors of polyethylene (PE) under high speed shock compression.
- ◇ Hugoniot curves in u_s-u_p and $P-u_p$ were presented, which agreed qualitatively with the experimental results.
- ◇ The molecular morphological evolution was investigated by the statistical method to study the major molecular deformation mechanism.
- ◇ All these simulations were based on LAMMPS and visualization was based on Ovito.
- ◇ Current achievements: 2 paper published and 1 paper revised.



Theoretical investigation on surface effects of nanoporous materials

- ◇ Studied surface effects on the mechanical behavior of nanoporous materials under high strains with an improved anisotropic Kelvin model.
- ◇ The influence of strut size of nanoporous materials was discussed, which became a key factor with consideration of the residual surface stress and the surface elasticity.
- ◇ The stress-strain relations were derived by the theories of Euler-Bernoulli beam and surface elasticity.
- ◇ Current achievements: 1 paper published.

Multi-scale investigations on the mechanical properties of CNT/fiber reinforced composites

- ◇ A periodic molecular dynamics (MD) model is proposed to investigate the mechanical properties of the interface between a functionalized single-walled carbon nanotube (SWNT) and matrix.
- ◇ A micro-geometrical model was constructed to reveal the random fiber networks and FEM was employed to investigate the micromechanics, failure mechanism and mechanical properties of this CNT/fiber reinforced composites using APDL in ANSYS.
- ◇ Current achievements: 5 papers published as a co-author.

• Research Interests •

- ◇ Modeling and simulation of composite materials

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- ✧ Fracture and damage analysis of composites
 - ✧ Multi-scale modeling of nano-materials

• Research Skills •

Computational skills:	Skilled in writing the UMAT subroutine in LS-DYNA, ANSYS and ABAQUS Skilled in Molecular Dynamics simulations with LAMMPS, Ovito and Atomeye Good at numerical computation using MATLAB, C and FORTRAN languages.
Theoretical skills:	Skilled in developing mechanical models for complicated material systems Deep understanding in fundamental theory, like continuum mechanics, elastic mechanics, material mechanics etc.
Experimental skills:	Experienced in static mechanical test and familiar with dynamic mechanical test.

• Honors and Awards •

2016	The prize of excellent academic paper (two papers)
2015	National scholarship for Graduate students (2.6/100)
2013	Chairman of School Graduate Student Union Football Referee National Level Two
2012	Chairman of School Graduate Student Union Basketball Referee National Level Two The Second-class graduate scholarship of Beihang University (15/100)
2011	Outstanding graduate student of Beihang University Second Place of AUBA of Beihang University
2010	Silver medallist of Chinese Undergraduate Mathematics Competitions Third-prize in the 20 th Beihang University Feng Ru Cup Competition
2008	Excellent Olympic Volunteer in Beijing Olympic Games Golden Boot of School Football Game