

# TIANYU WANG

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## PROFILE

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I currently work as a research assistant for Prof. Jin Huang in Physics&Geometry group, State Key Lab of CAD&CG, Zhejiang University. My research interest is mainly on physics-based simulation by numerical PDE solving and using numerical optimization for visual computing problems. I have some experience in solid and fluid simulation, geometry processing and deep learning.

## EDUCATION

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**Zhejiang University, Hangzhou, China**

M.Eng. in Computer Science

*September 2016 - Present*

Advisor: Prof. Jin Huang

**Sichuan University, Chengdu, China**

B.Eng. in Computer Science

*September 2012 - June 2016*

Overall GPA: 81.54/100

## PUBLICATION

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Jiong Chen, Hujun Bao, **Tianyu Wang**, Mathieu Desbrun, Jin Huang: Numerical Coarsening using Discontinuous Shape Functions. *ACM Transaction Graphics 37(4)(SIGGRAPH 2018)*, Vancouver, Canada, 2018

## RESEARCH EXPERIENCE

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**Research Assistant, State Key Lab of CAD&CG, ZJU**

*Advisor: Prof. Jin Huang*

September 2016 - present

*See below project section for details*

- **Numerical coarsening of FEM based solid simulation**
- **Cloth or solid simulation using mass-spring model**
- **Super-resolution of shallow water equation simulation based on GAN**

## GRAPHICS RELATED PROJECTS

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**Solid deformation and simulation related:**

**Cage based deformation using ARAP energy or moving least square**

Deform mesh based on coarse cage and use as-rigid-as-possible energy or moving least square method extending the paper *Image Deformation Using Moving Least Squares* to 3D.

**FEM simulation of solid using different constitutive models**

Dynamics or quasi-static simulation of solid using finite element method and using different constitutive models such as linear elasticity, co-rotational linear elasticity, St. Venant-Kirchhoff model and Neo-Hookean elasticity with tetrahedron mesh or hexahedron mesh.

**Cloth or solid simulation using mass-spring model**

Implement three versions of mass-spring based simulation: using classical newton method, using fast mass-spring method based on the paper *Fast Simulation of Mass-Spring Systems*, using modified fast mass-spring based on the paper *A Chebyshev Semi-Iterative Approach for Accelerating Projective and Position-based Dynamics* with a CUDA version jacobi solver acceleration.

**Numerical coarsening of FEM based solid simulation**

Research for numerical coarsening acceleration solving of FEM based solid simulation of heterogeneous

materials with non-linear constitutive laws with coarse grid. See the paper *Numerical Coarsening using Discontinuous Shape Functions* for details.

### **Geometry processing related:**

**CatmullClark subdivision of surface mesh** A course project.

### **Some discrete operator measuring curvature, normal on arbitrary triangle mesh**

Junior graduate student training based on the paper *Discrete Differential-Geometry Operators for Triangulated 2-Manifolds*, knowing the cotangent form curvature operator and practice of halfedge structure, mesh curvature measure and mesh smoothing based on the mean curvature flow.

### **Surface mesh fairness using different energy**

An implementation of the paper *An Intuitive Framework for Real-Time Freeform Modeling*, deforming mesh using different Laplace based energy: membrane surface energy, thin-plate surface, minimum variation surface energy with some fixed point constraints.

### **Heat flow based geodesic distance computation**

An implementation of the paper *Geodesics in Heat: A New Approach to Computing Distance Based on Heat Flow*. The algorithm core is just solving a poisson equation!

### **L1-based construction of polycube maps for mesh**

An implementation of the core algorithm of the paper *L1-based Construction of Polycube Maps from Complex Shapes*.

### **ARAP parameterization of triangle mesh**

An implementation of the paper *A Local/Global Approach to Mesh Parameterization*.

### **Fluid simulation related:**

**Shallow water simulation with weakly two-way coupling with rigid body** Practice.

### **Water simulation based on SPH method**

An implementation of the earliest SPH based water simulation paper *Particle-Based Fluid Simulation for Interactive Applications*.

### **FLIP or PIC based water simulation with boundary correction**

A simplified FLIP or PIC fluid solver with the boundary correction based on the paper *A Fast Variational Framework for Accurate Solid-Fluid Coupling*.

### **Deep learning related:**

#### **Image style transfer**

Pretend to be Vincent using the paper *A Neural Algorithm of Artistic Style*!

### **Handwriting number generation based Generative Adversarial Networks(GAN)**

A simple implementation of the paper *Generative Adversarial Networks* with just full connection layer on the handwriting number generation application.

### **Super-resolution of shallow water equation simulation based on GAN**

Research for SWE simulation data's super-resolution using GAN. See the [report](#) for details.

### **Rendering related:**

**A naive path tracing solver** A course project.

## HONORS AND AWARDS

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**Graduate of Merit/Triple A graduate**, Zhejiang University, 2018

**Award of Honor for Graduate**, Zhejiang University, 2018

**Wen Chixiang Scholarship**, Zhejiang University, 2018

**Silver Medal**, ACM-ICPC China Provincial Programming Contest, Chengdu Site, 2013 and 2014

**2nd University Scholarship**, Sichuan University, 2013

## SKILLS

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**Languages** C/C++,Python,Latex,Java

**Toolkit** Eigen,Boost,NumPy,Tensorflow,OpenGL,OpenCV,CUDA,OpenMP,ParaView,  
GIMP,Inkscape,CMake(Linux),Git,SVN

**Platforms** Linux 16.04

## EXTRA-CIRRICULAR

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I love basketball and play as a point guard skilled in shooting!

I love film and TV series and write film review on [movie.douban.com](http://movie.douban.com)!