Hao Wei

Date of Birth:1997/12, Gender:Male, Nationality : Chinese

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Education

Zhejiang University **Sep. 2020 – Mar 2023**

Master of Thermophysics engineering *Hangzhou, China*

- **GPA:** 3.90/4.0 (**Top 1%**)
- **Scholarships:** Excellent student scholarship
- **Rewards:** Award of Honor for Graduate,Outstanding Graduate Leader award, Graduate of Merit/Triple A graduate (less than 1.5%)

Northeastern University **Sep. 2016 – Jun 2020**

Bachelor of Energy and power engineering *Shenyang, China*

- **GPA:** 4.04/5 (**Top 1%**), CET-6: 540
- **Scholarships:** National Scholarship(**0.3%**), Top student scholarship(First class, **Top 1%**,four consecutive years)
- **Rewards:** Top ten student of NEU(**less than 0.1%**), Municipal Outstanding student, Provincial Outstanding student

Solid Background

- Computational Fluid Dynamics
- Machine Learning Approaches
- Combustion Modeling
- Math and Physics(PDE)
- Algorithm and Data Analysis
- Numerical Calculation

Research Interest

- Simulation Based on Physics
- Machine Learning Enhanced Model
- Physics-based Machine Learning
- Computational Robotics
- Virtual Reality
- Computer Graphics

Internship

Microsoft Ai4Science Lab **Aug 2022 – Now**

Resaerch intern *Beijing, China*

- Work on using AI algorithm (such as Fourier Neural Operator, FNO) solving Partial Differential Equation (PDE)
- Build a SIMPLE solver based on Finite Difference Method (FDM) in PyTorch, which have been successfully used in calculating channel flow and cavity flow.
- Build a solver based on Finite Volume Method (FVM) in NumPy, which have been successfully used in calculating turbulence and Darcy flow.

Projects I am in charge of

Accelerating gas-solid flow with LSTM | *Python, Machine learning, gas-solid flow* **May 2022 – Now**

- The gas field is initialized with the famous Green-Taylor vortex.
- The Lagrange method is used to calculate the motion diffusion process of 10000 particles uniformly distributed at the initial time when Re=1000 in the calculation region.
- A machine learning approach, Long short-term memory (LSTM) algorithm is used to accelerate the calculation of particles movement.

General models for tobacco pyrolysis | *Python, Fortran, Machine learning, Pyrolysis* **Jun 2021 – Jan 2022**

- Built a tobacco pyrolysis database which including 49 different kinds of tobaccos pyrolyed under wide heating rates and the chemical information of them.
- Proposed an original algorithm to stratified tobacco samples by pyrolysis behaviour.
- Developed a general model named Toba-CPD based on Bio-CPD for tobacco pyrolysis which is strongly related with chemical principle.
- Informatively developed a general tobacco pyrolysis model based on the complex chemical constituents and heating conditions using machine learning approaches.

General model for co-pyrolysis of biomass and coal | *Python, Machine learning, Co-pyrolysis* **Nov 2020 – May 2021**

- Built a biomass and coal co-pyrolysis database from experimental data in published literature.
- Informatively explored a new method to accurately model co-pyrolysis using machine learning approaches, specifically the random forest algorithm based on *classification and regression trees* and *extremely trees*.

Model for determining gas flammability limit | *Python, Cantera* **Dec 2019 – Jun 2020**

- Build an model for determining the flammability limit of C_3H_8 under O_2/CO_2 atmosphere based on flame speed.
- Firstly investigated the effects of high CO_2 concentration, elevated temperature and pressure on the lower flammability limit of C_3H_8 based on the results calculated from algorithm.

Experimental and model investigation of laminar flame speeds | *Ansys Chemkin, Matlab* **Jun 2019 – May 2020**

- Measured the flame speed of C_3H_8 under O_2/CO_2 atmosphere through Bunsen burner.
- Built an model for measuring the flame speed from experimental figures with Matlab.
- Detected the proper mechanism for combustion of C_3H_8 under O_2/CO_2 atmosphere, then calculated the flame speed of C_3H_8 under O_2/CO_2 atmosphere.

A new automatic device for controlling dormitory circuit | *Java, Android, ZigBee* **Jun 2018 – May 2019**

- Designed a new circuit control system based on multiple sensing technology (including photo-gate, voice-activated sensor, smoke detector and pyroelectric infrared sensor) for for automatically controlling dormitory circuit.
- Designed a communication system based on ZigBee for administrators to manage all dormitory circuits.
- Developed an Android App for users controlling their dormitory circuit.

Technical Skills

Languages: Python, C++, LaTeX
Developer Tools: Pytorch, TensorFlow, Taichi, Sci-kit learn, OpenFOAM, Eigen, Cantera
Learning: CUDA, OpenCV

Publications & Scientific Rewards

Rewards

- The third prize of National University Student Science Contest on Energy Saving Emission Reduction.(List 1)
- The third prize of National University Student Science Contest on Metallurgical Science and Technology.(List 1)

Publications

- Hu, X., **Wei, H.**, 2020. Experimental investigation of laminar flame speeds of propane in O_2/CO_2 atmosphere and kinetic simulation. *Fuel* 268, 117347.(SCI,Top, Q1, IF=8.035)
- **Wei, H.**, Hu, X., Huang, B., 2022. The effect of CO_2 on the lower flammability limit of C_3H_8 in O_2/CO_2 atmosphere at high temperature and pressure. *Fuel* 308, 122023.(SCI,Top, Q1, IF=8.035)
- **Wei, H.**, Luo, K., Xing, J., Fan, J., 2022. Predicting co-pyrolysis of coal and biomass using machine learning approaches. *Fuel* 310, 122248.(SCI,Top, Q1, IF=8.035)
- **Wei, H.**,Luo,K. Fan, J., Peng Y., Xing J., Fan J., 2022. Toba-CPD: An Extended Chemical Percolation Devolatilization Model for Tobacco Pyrolysis. *ACS Omega* (SCI, IF=4.132)
- **Wei, H.**,Xing, J., Luo, K., Peng, Y., Fan, J., 2022 Predicting tobacco pyrolysis based on chemical constituents and heating conditions using machine learning approaches. *Proceedings of the Combustion Institute* (under review)
- Zhao J., Tian Y., **Wei, H.**,Hu, X., 2022 Study on the laminar burning velocities of ethane/oxygen/carbon dioxide mixture in ordinary condition. *Energy* (under review)