Jiashun Pang(庞嘉顺)

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Research interests:

Computational Mechanics and Applied Mathematics, with applications to Dynamical Systems and Multiphysics Simulation. Research on physics-informed scientific AI, including the framework for automated model discovery(***MosaicX***), ontology-based knowledge graph integration tool chain(***Sessync***), and large language model logic plugins for explainable and trustworthy reasoning(***OntoPolit***).

Core Skills:

Computational Mechanics & Applied Mathematics:

Continuum mechanics and fluid mechanics, physics-informed modeling, dimensional analysis, Dynamical systems theory, Nonlinear and asymptotic analysis; similarity methods, Optimization

AI4Science & Knowledge Graphs:

Ontology modeling, semantic reasoning, trustworthy LLM logic plugins, and machine-scientist workflows for automated model discovery and scientific reasoning.

Software & Programming:

Python, MATLAB, Web development (React, Flask/FastAPI), APP development(Qt, Docker), Git/GitHub, CAD & 3D modeling (Solidworks), CFD tools, Semantic/KG tools(OWL-LLM-Cookbook)

Education

M.Sc. in Fluid Mechanics

University of Manchester, Department of Mechanical Engineering

2020 – 2021

Thesis: Development of Smoothed Particle Hydrodynamics (SPH) algorithms for fluid mechanics

B.Eng. in Mechanical Engineering

University of Leeds, School of Mechanical Engineering

2017 – 2020

Thesis: Fracture risk analysis of lumbar vertebrae after cancer bone metastasis

Exchange Program in Robotics

Hong Kong University of Science and Technology (HKUST), Department of Automation

2018 – 2019

Professional Experience

Research Assistant | 2021 – Present | *Institute of Mechanics, Chinese Academy of Sciences (Key Laboratory of Fluid–Structure Interaction)*

- Developed ontology-driven modeling frameworks and **large language model logic plugins**, combining logical reasoning with data-driven approaches for physics knowledge representation and trustworthy AI4Science. **(OntoPilot, MechOn-fluid)**
- Developed **MosaicX**, a physics-constrained framework that transforms implicit relations into an explicit *patch atlas*, integrating uncertainty quantification across regions and experimental points to build a usable and optimizable structural system.
- Developed a data-driven dimensional analysis framework enabling the discovery of dimensionless explicit functions from experimental data in the absence of prior models. **(DDDA)**
- Conducted research on **fluid–structure interaction and multiphysics CFD solver development**, applied to **atomization - Pelton turbine optimization**, as well as **immersed particle flows**.

Research Assistant (Part-time) | 2019 – 2020 | *University of Leeds, School of Mechanical Engineering*

- Assisted in the development of new fuel cell teaching modules.

Selected Projects & Contributions

OntoPilot – Ontology-driven framework integrating OWL DL reasoning (via HermiT) with LLM plugins to provide semantic guidance and hallucination detection for safe and interpretable AI**. *(Creator & Lead Developer)*

MosaicX – A physics-constrained framework that transforms implicit relations into explicit *patch atlases* for model discovery.*(Creator & Lead Developer)*

MechOn-fluid – Ontology-based fluid mechanics knowledge graph. *(Creator & Lead Developer)*

DDDA – Data-Driven Dimensional Analysis framework *(Primary Contributor)*

Sessync – Ontology generation and crowdsourced validation toolchain for task publishing, review, and quality assurance. *(Creator & Lead Developer)*

Other Experience

Teaching & Volunteering: Volunteer teacher in Yushu, Qinghai (2018 & 2023), Wenshan, Yunnan (2025)

Leadership & Service: Student Representative, University of Leeds (2020) and University of Manchester (2021)

Engineering Competitions: Formula Student China (2014, 2016), Baja China (2017), Formula Student UK (2018), Dyson Award (2019)

Sports: Archery team, University of Leeds, UK

Engineering-related Achievements

LLM Application Development (3 iterations)

V1: Selenium + Gradio + LlamaIndex testing environment

V2: Frontend iteration to React, preparing for production

V3: Playwright + React + FastAPI, redesigned architecture with knowledge-graph module

Hydroturbine Parametric Modeling Tool (MATLAB)

Developed a Bezier-curve based parametric tool for impulse turbine buckets using control points and shape parameters.

Jet-impulse Turbine CFD Simulations (Basilisk, Parallelized- OpenMP, MPI)

Conducted CFD coupling simulations of jet and bucket flows with parallel tools. The 6-DOF motion issue limited full pipeline execution (modeling → CFD → data analysis).

Vortex Shedding Oscillation Experiment (Engineering Modeling)

Website Development & Prototyping(for DDDA)