

Zhouyayan Li, B.Eng.

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RESEARCH INTERESTS

- Hydrologic Modeling and Model Improving
- Hydro-informatics and High-performance Computing
- Water Resource Planning and Management
- Simplified (Non-Physics-Based) Conceptual Hydrological Models

EDUCATION

Hohai University (HHU), Nanjing, China *Sept. 2013 – Jul. 2018 (Gap in 2016 for Family Reasons)*

Bachelor's Degree in Water and Hydropower Engineering.

Average Score: 88/100

PUBLICATIONS & PRESENTATIONS

- **Publication:**

Yu, Y., Wang, S., **Li, Z.**, 2019. Application of Numerical Simulation to Study the Water Quality Improvement. Journal of Water Environment Management (*in Chinese*), 22-28.

- **Presentation:**

Hu, A., **Li, Z.**, Manazir, A., Demir, I., Interactive and Real-time Flood Inundation Mapping on Client-Side Web Systems, AGU Fall Meeting, December 91-3, 2019, San Francisco, CA.

- **Working Paper:**

Li, Z., Fang, Y., Ding, G., Water Resource Planning and Management of Zambezi River in Zambia and at the Zambia-Zimbabwe Junction Based on Multi-Dam System (submitted to South-to-North Water Transfers and Water Science Technology, under review, *in Chinese*).

RESEARCH EXPERIENCE

IIHR—Hydroscience & Engineering, Maxwell Stanley Hydraulics Laboratory, the University of Iowa (UIowa)

Real-time Flood Inundation Mapping and Communication Project

Research Assistant. Supervised by Dr. Ibrahim Demir, Assistant Professor at UIowa *Nov. 2019 – Present*

Jun. 2019 – Aug. 2019

- Implemented the calculating and visualization module of Strahler stream order and watershed scope for the Iowa Flood Information System (IFIS) using JavaScript and Python programming language.
- Designed a Breadth-First Search method coupled with the Depth-First Search. Carried out algorithm optimization to achieve high computing efficiency. After optimization, the calculation for 5000 by 5000 DEM data can finish by 7 seconds on ordinary computers.
- Implemented calculating and visualization modules of two different kinds of catchment-averaged river geometry parameters and rating curves (stage height-discharge) using flow direction matrix, stage heights and the HAND

model (Height Above the Nearest Drainage).

- Figured out the framework of the HAND method improvement for the next step.

Laboratory of Hydrology, Water Resources and Water Conservancy Engineering, Hohai University (HHU)

Water Resource Planning and Management of Zambezi River Based on Multi-Dam System

Research Assistant. Supervised by Dr. Genhong Ding, Associate Professor at HHU *Apr. 2019 – May 2019*

- Determined 11 available dam sites on part of the Zambezi River according to hydraulic construction requirements and rudimentary terrain data.
- Built the Water-storage & Electricity-generation & Cost model using DEM data and the existing parameters of Kariba Dam. Applied Non-dominated sorting genetic algorithm II (NSGA-II) to solve the multi-objective dam optimization problem using Python programming.
- Defined and applied risk-cost and P-index evaluation indexes. Identified the optimal multi-dam system with the most significant water storage and electricity generation capacity in a stepwise way.
- Established the most beneficial operational mode of this multi-dam system under extreme water flows (high water flow & low water flow). Analyzed the effect of the dam system on the flow condition near dam sites in extreme circumstances.

Department of Research & Development, Techand Co., Ltd

Research Assistant in the following projects. Supervised by Dr. Yuezeng Yu, Chief Expert in River and Lake Management of Techand Co., Ltd *Jul. 2018 – Feb. 2019*

The Optimal Water Circulation System Design in a Boot-Shaped Gulf Region

- Studied the impacts of tidal variation from the open sea and different rainwater loads that drained into an inland bay that located in Haikou, China, on its hydraulic, water quality, and sediment movement characteristics. Applied HD, Advection-Dispersion, Sand Transport and Ecolab function modules of MIKE 2D to a case study of that region.
- Found out the area with the worst hydraulic conditions of water circulation. Determined the optimal volume and position for the artificial water circulation system to improve the hydraulic condition and expedite the pollution diffusion in the bay.
- Established the optimal operational mode of tidal gate to help improve local hydraulic condition.

Verification of the Effectiveness of Multiple Water Quality Improvement Plans for River Networks

- Designed and carried out several simulation experiments in water flow and pollutant movements using MIKE 11 and HEC-RAS by combining various water quality improvement measures.
- Analyzed the reason for the differences between the outcomes of simulation experiments and actual measured data, analyzed the shortcomings of the current data measurement scheme and assisted in making the new pollution source measurement plan.
- Carried out sensitivity analysis of the simulation outcomes under different water quality improvement plans and determined the most effective water quality improvement plan for Ding Hu region, China.

Laboratory of Hydrology, Water Resources and Water Conservancy Engineering, Hohai University (HHU)

Design of Gravity Dam and Optimization of Dam Shape (Undergraduate Thesis)

Research Assistant. Supervised by Dr. Miaolin Dai, Associate Professor at HHU

Mar. 2018 – Jun. 2018

- Applied homogenous frequency enlargement method to given flood data to obtain the flooding process with a certain magnitude. Figured out the controlling measures of the dam body according to a certain degree of reliability requirements during the flood process.
- Designed a specific Python program that can automatically find out the optimal upstream and downstream slope of the dam body that satisfied strength requirements as well as stability demands.
- Checked the mechanical index of several controlling cross-sections toward the national standard for dam designing.
- Analyzed the seepage-coupled stress field within the dam body and the foundation of the dam using the finite element software (GeoStudio).

SKILLS & COURSES

- Programming: Proficient in Python, JavaScript and MATLAB
- Technical: Hydrologic model efficiency improving, Water resource plan designing
- Standardized Test Scores: GRE 159V+163Q+3.5AW (322+3.5); TOEFL R29+L29+S24+W27 (109/120)
- Relevant Courses: Calculus (92/100), Probability & Statistics (96/100), Programming (91/100), Hydraulics (95/100), Engineering Hydrology (95/100), Water Resources Planning and Development (94/100)

HONORS & REWARDS

Excellent Graduate Award (top 0.3% out of all 4300 undergraduates, HHU)	<i>Jun. 2018</i>
Excellent Student Scholarship from 2014 to 2018 (top 5% in Engineer Department, HHU)	<i>Oct. 2014-Jun. 2018</i>
<i>Yan Kai</i> Scholarship (top 2% out of 450, HHU)	<i>Dec. 2017</i>
National Scholarship (No. 1 out of 152)	<i>Dec. 2016</i>
China Mechanics Competition in Honor of Pei-Yuan Chou, 3rd Prize (top 0.1%)	<i>Jan. 2016</i>
Higher Mathematics Competition of Jiangsu Province, Outstanding Winner (top 0.1%)	<i>Jan. 2016</i>
China Undergraduate Mathematical Contest in Modeling, 1st Prize (top 0.03%)	<i>Nov. 2015</i>
<i>Jikang</i> Major Award (top 1% out of 820, HHU)	<i>Aug. 2015</i>