

# CURRICULUM VITAE

Xuehang Song

## Contact Information

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## Education

- **Wuhan University** Wuhan, China  
Ph.D. student in Hydrology & Water Resources Engineering  
9/2009-present  
Dissertation: Data assimilation application to the Saturated-unsaturated Flow  
Advisor: Jinzhong Yang
- **Wuhan University** Wuhan, China  
B.E. in Hydrology & Water Resources Engineering 9/2005-6/2009  
Undergraduate Thesis Project: Water Resources Assessment and Water-saving Reform  
Planning in Hetao Irrigation Area (Inner Mongolia Autonomous Region, China)

## Research Interests

- Groundwater flow and solute transport modeling
- Vadose zone hydrology
- Stochastic hydrology and data assimilation
- High performance computing

## Research Experiences

- **6/2012-present: Data assimilation application to the saturated-unsaturated flow**
  - (1) Establish an operational data assimilation model coupled with the 2D groundwater model Satu-2D.
  - (2) Establish a data assimilation model coupled with 1D/2D variably saturated flow models. The data assimilation model contains algorithms such as EnKF, Confirming EnKF, Restart EnKF, modified Restart EnKF, EnRML, etc.; it can be easily integrated with various kinds of model including HYDRUS, ROSS-1D, Picard- $\theta$ , etc. The program is modular and can be executed both in parallel and in sequence.
  - (3) Conduct field infiltration experiments to validate the data assimilation model at Irrigation and Drainage Experiment Site in Wuhan University.
- **1/2010-12/2013: Field study of groundwater recharge in North China Plain**
  - (1) Calculate the difference of potential recharge and actual recharge, quantitate the critical depth of potential recharge, and analyze the effects of vadose zone thickness and lithology

on groundwater recharge using HYDRUS and INFIL3.0.

- (2) Conduct 4 years of field tracer experiment in piedmont aggraded valley plain and median plain of the North China Plain, and 2 years of laboratory controlled experiment using microlysimeter located at Irrigation and Drainage Experiment Site in Wuhan University.
  - **2/2009-12/2009: Water resources assessment and water-saving reform planning**
- (1) Participated in the residents-resettlement plan for the Tingzikou Water Control Project. Conduct field research, policy and program development, and report writing (Sichuan Province, China)
- (2) Participated in the program “Three Gorges Follow-up Planning (the Section of Countryside Potable Water and Irrigation)”. Conduct field research, policy and program development, and report writing. This program is the most important one of its kind in China. (Central China).

### **Skills**

- Strong programming skills (FORTRAN, MATLAB, etc.), experienced with parallel computing paradigms (MPI), workstation clusters and various operating systems (Linux and Windows).
- Familiar with the application of the water flow and solute transport models such as MODFLOW, HYDRUS 1D, SWMS2D (HYDRUS2D), and the graphic design softwares including AutoCAD, Tecplot, Surfer, OriginPro, CorelDraw, etc.
- Extensive field work experience, familiar with soil chemical and physical tests.

### **Funding History**

- Ph.D. candidates self-research program of Wuhan University in 2012 (No.2012206020216).

### **Membership**

- Vice president, Wuhan University Student Chapter of International Association for Hydro-Environment Engineering and Research (**IAHR-WHUSC**) (2011-2012).

### **Awards & Honors**

- 2012           Excellent Director in IAHR-WHUSC.
- 2009           Excellent Graduation Award (5%), Wuhan University.
- 2005-2009    Excellent Student Scholarship (the Third Class, the Second Class and the First Class), Honor Student Award, Excellent Student Leader Award in extracurricular activities.

### **List of Publications**

- **Xuehang Song**, Liangsheng Shi, Jinzhong Yang (2014), One-dimensional variably saturated flow model combining head-based and water content-based forms of Richards' equation, *under preparation*.
- **Xuehang Song**, Liangsheng Shi, Jinzhong Yang (2014), The value of water table level data in unsaturated flow inverse modeling, *under preparation*.
- **Xuehang Song**, Liangsheng Shi, Ming Ye, Jinzhong Yang and I. Michael Navon (2014),

Numerical comparison of iterative ensemble Kalman filters for unsaturated flow inverse modeling, *Vadose Zone Journal*, 13(2), doi:10.2136/vzj2013.05.0083.

- **Xuehang Song**, Liangsheng Shi, Jinzhong Yang (2014), Application of ensemble Kalman filter in phreatic water flow, *Journal of Wuhan University (Engineering Science Edition)*, *in press*. (In Chinese with English Abstract).
- Yuanyuan Zha, Liangsheng Shi, Jinzhong Yang, **Xuehang Song** (2013), Simulating one-dimensional unsaturated flow in heterogeneous soils with soil moisture based Richards' equation, *Vadose Zone Journal*, 12(2), doi:10.2136/vzj2012.0109.
- Xiucui Tan, Jinzhong Yang, **Xuehang Song**, Yuanyuan Zha (2013), Estimation of groundwater recharge in North China Plain, *Advances in Water Science*, 22(1):73~81. (In Chinese with English Abstract).

### **Presentation in Conference**

- **Xuehang Song** (2010), Spatial and Temporal Distributions of Precipitation in the Loess Plateau of China, *International Conference on Modern Hydraulic Engineering (CMHE2010)*, Xi'an, Shanxi Province, China.
- **Xuehang Song** (2011), Improving groundwater recharge prediction using data assimilation, *The Ninth China Water Forum*, Lanzhou, Gansu Province, China.

## Contact Information of Referees

### **Jinzhong Yang**

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### **Jingwei Wu**

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