

# Mr. He, Bowen

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## Professional

Bachelor's degree in nuclear technology, Xi'an Jiaotong University

June 2016

Master's degree in environmental engineering, Vanderbilt University

May 2018

Ph.D.'s degree in environmental engineering, Vanderbilt University

Aug 2018-present

## Highlights

Strong Academic Record

Highly Involved in Campus Activities

Efficient, Responsible, Assiduous and Motivated

## Education

08/18-present	Civil and Environmental Engineering Department, Vanderbilt University Major: Environmental Engineering GPA: 4.0/4.0 Doctoral of Philosophy	Nashville, U.S
08/16-05/18	Civil and Environmental Engineering Department, Vanderbilt University Major: Environmental Engineering GPA: 3.9/4.0 Master of Science	Nashville, U.S
2012-2016	School of Energy and Power Engineering, Xi'an Jiaotong University (XJTU) Major: Nuclear Engineering and Nuclear Technology GPA: 84/ <b>100</b> Major GPA: 87/ <b>100</b> Ranking: <b>3/15</b> Bachelor of <b>Engineering</b> (07/2016)	Xi'an, China

## Experiences

### ◆ Internship Experiences

- 07/15 Institute of High Energy Physics Chinese Academy of Sciences**  
>Attended academic conference and forum  
>Visited Beijing synchrotron radiation station and learned the movement principle of the electron-positron collider  
>Participated in the experiment and test process of synchrotron radiation facility
- 07/14 Northwest Institute of Nuclear Technology**  
>Learned the operating methods of facilities  
>Collected experimental data  
>Analyzed experimental data and experimental result

### ◆ Research Experiences

- 11/20-present Incorporating Spatial Autocorrelation in Dasymetric Analysis: A Hierarchical Poisson Spatial Disaggregation Regression Model (HPSDRM)**  
**Project Leader**  
> A HPSDRM that can disaggregate aggregated counts to finer scale grid counts was developed.  
> The HPSDRM successfully incorporates spatial autocorrelation to reveal the hot spots in the underlying disaggregated grid surface.  
> Nashville tract data was successfully spatially disaggregated into 150m\*150m grid scale population surface.

**Achievement:** Project result is in the process of publication on a high-level peer-review journal.

11/20-present

**Nashville Flood Mitigation Project: spatial-temporal analysis to provide policy-makers scientific-based evaluation of environmental hazards mitigation efforts.**

**Project Leader**

- > A quantitative index (SoFI) that can measure the social fabric condition of a community was published.
- > An uncertainty and sensitivity analysis was conducted on the SoFI model.
- > The SoFI model was tested on the Nashville tract data.

**Achievement:** Project result is planned to be published on a high-level peer-review journal.

05/20-present

**Nashville Sustainability Project: an innovative way to explore various future Greenhouse gas emissions reduction possibilities**

**Project Leader**

- > A detailed Rmarkdown format report that summarizes and analyzes the city of Nashville's greenhouse gas (GHG) emissions will be published.
- > An interactive RShiny application that will allow policymakers and citizens to understand the impacts of different potential policies on GHG emissions directly, as well as explore interactions between different potential policies will be published.

**Achievement:** Project result is planned to be published on a high-level peer-review journal, and the Rmarkdown reports will be delivered to the Nashville Mayor's office for drafting the Nashville city's climate mitigation action plan. The RShiny application will be published online for citizens to interact with the different potential future climate policies to assess the associated impacts on GHG emissions and local climate stress.

08/20-present

**Global Greenhouse Gases Emissions Effect on Extreme Events under an Uncertain Future: A Case Study in Western Cape, South Africa**

**Project Leader**

- > Global Climate Model-Regional Climate Model (GCM-RCM) chain model Max Planck Institute-Earth System Model/REMO (MPI-ESM-REMO) was used to project future extreme climate indices in Western Cape, South Africa.
- > Three Representative Concentration Pathway (RCP): RCP 2.6, RCP 4.5 and RCP 8.5 to indicate future greenhouse gases emissions uncertainties.
- > Two kinds of extreme weather events were investigated: drought and heat wave. Two extreme climate indices were used to predict future drought risks and six extreme climate indices were used to predict future heat wave risks in Western Cape, South Africa.

**Achievement:** Project result is planned to be published on PLOS climate, First Author.

04/20-3/21

**Localize the Impact of Global Greenhouse Gases Emissions under an Uncertain Future: A Case Study in Western Cape, South Africa**

**Project Leader**

- > Global Climate Model-Regional Climate Model (GCM-RCM) chain model Max Planck Institute-Earth System Model/RCA 4 (MPI-ESM-RCA 4) was used to project future climate signals in Western Cape, South Africa.
- > Three Representative Concentration Pathway (RCP): RCP 2.6, RCP 4.5 and RCP 8.5 to indicate future greenhouse gases emissions uncertainties.
- > Climate Characteristics including precipitation, daily mean and maximum near-surface air temperature, and evaporation are considered to evaluate future climate risks in Western Cape, South Africa.

**Achievement:** Project result was published on Earth Journal, First Author.

09/18-05/19

**Influences of Hydrologic Exchange Flows on River Corridor and Watershed Biogeochemical Function**

**Graduate Research Assistant**

- > Spectral Analysis as a tool to identify the characteristic spatial scales of the topography

- > Evaluate Wörman's analytical solution on predicting the 3D surface-groundwater Interactions.
  - > Propose a new method to transform the Fourier fitting method into a new fashion
  - > Propose a new method to improve the prediction accuracy of the landscape and hydraulic Head distribution
- Achievement:** Project result was published on Journal of Water and Climate Change (sci), First Author.

02/18-05/18

### **Is Increasing Water Permeability Unnecessary for Desalination Membranes?**

#### **Graduate Research Assistant**

- > Evaluate the role that water permeability coefficient plays in the desalination membrane
- > Evaluate the impact of increasing the water permeability coefficient on different salinity feed from 2 perspective
- > First perspective (Membrane Area perspective): when increasing the water permeability coefficient, calculate the membrane area needed to achieve the target volume of product for each given applied hydraulic pressure
- > Second perspective (Specific Energy Consumption perspective): when increasing the water permeability coefficient, calculate the SEC for different salinity feed
- > Evaluate the impact of intrinsic rejection rate in this research context

05/17-01/18

### **Simulation of uncertainty aggregation associated with undissolved solids in the pretreatment facility in Hanford site, WA.**

#### **Graduate Research Assistant**

- > Review the function of Monte Carlo simulation software Goldsim.
- > Review the LOAM model that describes the segregation of UDS and apply them into Goldsim model.
- > Design the waste transfer volume uncertainty and apply the uncertainty into Goldsim model.
- > Build the whole model that accounts for uncertainties associated with transfer volume uncertainties and transfer UDS segregation.
- > Use Goldsim to look at model properties from probability distribution perspective to get a big picture of how our final goal can be affected by those uncertainties that we take into account.
- > Remove all uncertainties and check whether the model is accurate or not.

**Achievement:** Be able to use Goldsim to simulate that the slurry is transferred and processed between 4 types of vessels within the pretreatment facility from tank farm feed to the exit of high level waste and 4 types of UDS's model properties can be studied from Monte Carlo perspective (Probability distribution) in each of 4 vessels.

01/16-08/16

### **Geant4 Simulation of Proton Displacement Damage in GaN**

#### **Project leader**

- > The information of the type and the energy of the PKA (Primary Knock-on Atoms) created in GaN and the number of displacement damage were calculated with protons with energy of 1、10、100、500 MeV
- > The distribution of displacement damage of 10 MeV proton was calculated
- > The NIEL (Non-Ionization Energy Loss) was studied and calculated of those 4 energy proton irradiating GaN
- > Factors impacting the production of displacement damage were deliberated

**Achievement:** Project result was published on Atomic Energy Science and Technology (EI), First author.

05/13-01/15

### **Research on the Power Exact Solution of Piezoelectricity Laminated Beam**

#### **Undergraduate Research assistant**

- > Deduced the state vector equation of piezoelectric material
- > Calculated state space solution of free running frequency simply supported piezoelectric beam
- > Tested the precision of Solution Verification

**Achievement:** Project results was published on Anhui University of architecture Academic Journal, Second author.

01/13-12/14

## **Exact Solution based on State-space Method Piezoelectricity Laminated Beam**

**Undergraduate Research assistant**

>Deduced the state variable spatial solution of elastomer plane problem

>Tested the basic characteristics of piezoelectric material

>Treated and analyzed the calculation result by use of Ansys

**Achievement:** Project results was published on Engineering and Construction, Second author.

## **Publications**

### **Peer-Reviewed Journal Publications**

Google scholar link: [https://scholar.google.com/citations?user=7Ml\\_yl8AAAAJ&hl=en](https://scholar.google.com/citations?user=7Ml_yl8AAAAJ&hl=en)

He, B., Q. Guan (2021), A Risk and Decision Analysis Framework to Evaluate Future PM<sub>2.5</sub> Risk: A Case Study in Los Angeles-Long Beach Metro Area, *International Journal of Environmental Research and Public Health*, 18(9), 4905.

He, B., K. Ding (2021), Localize the impact of global greenhouse gases emissions under an uncertain future: A case study in Western Cape, South Africa, *Earth*, 2(1), 111-123.

He, B., Q. Guan (2020), The statistical analysis and prediction associated with nuclear meltdown accidents risk evaluation, *International Journal of Nuclear Safety and Security*, in press.

He, B., Q. Guan (2020), A mathematical approach of improving the representation of surface water-groundwater exchange in hyporheic zone, *Journal of Water and Climate Change*, 12(5), 1788-1801.

He, B., C. He, S. Shen, Y. Chen (2017), Geant4 Simulation of Proton Displacement Damage in GaN, *Atomic Energy Science and Technology*, 51 (3): 543-548.

Wu, x., B. He, Q. Guan (2015), Exact Solution based on State-space Method Piezoelectricity Laminated Beam, *Engineering and Construction*, 29 (1): 18-23.

Lu, Y., B. He, Q. Guan (2015), Power Exact Solution of Piezoelectricity Laminated Beam, *Journal of Anhui Institute of Architecture & Industry (Natural Science)*, 23 (3): 79-84.

Total Citation: 5.

### **Proposal(s)**

He, B. (2018), Control of River-Groundwater Exchange Flows by Bed Sediment Characteristic.

He, B. (2021), Efficient Computational Evaluation of Vulnerability, Resilience, and Sustainability of Social-Environmental Systems in the City of Nashville.

## **Teaching Experiences**

09/18-present Teaching Assistant at Civil and Environmental Engineering Department, Vanderbilt University

09/12-07/13 Volunteer Chinese teacher in Foreign Friend Communication Club

## **Honors and Awards**

Carl E. Adams Graduate Award (\$4000)

2019-2020

## **Presentations**

**Surface water and groundwater-A single resource**, oral, Mar. 28/2019, Three-Minute-Thesis. Presenter: Bowen He.

**Spectral Analysis as a tool to identify the characteristic spatial scales**, oral, Nov. 20/18, Presented to Pacific Northwest National Lab (PNNL). Presenter: Jesus Gomez-Velez, Bowen He.

## **Extracurricular Activities and Honors**

08/2019-present American Academy of Environmental Engineers and Scientists (AAEES) at Vanderbilt  
**President**

03/2015-09/2015 College Student Smart Life Creative Design Contest

**Team Leader**

>Sampled images and program design of video detection  
>Developed the program design for formatter board  
>Tested and debugged whole program  
Achievement: Our work won Award of Merit in College Student Smart Life Creative Design Contest and successfully achieved automatic monitoring and automatic control switch in empty room.

02/2015 China Future Leadership Project  
10/2014 Memorial Award in USA Boston Head of the Charles Regatta  
07/2012-09/2014 Leading Player of The Rowing Club of Xi'an Jiaotong University  
04/2014 Ninth Place in New Zealand University Cup open Boat Tournament  
09/2013 Second Place in Xi'an Jiaotong University and The Fourth Military Medical University Boat Race  
07/2013-08/2013 Eighth Place in World Famous University Powerboat Challenge  
09/2012 Champion of Xi'an Jiaotong University and The Fourth Military Medical University Boat Race  
11/2012 The First Prize in China Cup boat race  
07/2011 National-level Basketball Athletes Certificate by Basketball Association of National High School  
08/2008 Piano Grade 10 Certificate by The China Music Institute  
08/2007 Piano Grade 10 Certificate by The Shanghai Conservatory of Music

## Computer and Computational Modeling Skills

Proficient in FORTRAN, AutoCAD, MATLAB, Ansys12.0, VB, LABVIEW, Geant4, R Studio, Goldsim, Comsol Multiphysics; HTML, Java, CSS, JavaScript, SQL, NetLogo, C++.

## Standardized Tests

TOEFL: 102 (R: 28, L: 23, S: 23, W: 28)  
GRE: 322 (V: 152 54%, Q: 170 98%, AW: 3 15%)

Taken Date: 05/24/2015  
Taken Date: 10/17/2015

## Interests & Hobbies

Piano, Basketball, Swimming, Rowing, Reading, Distance Running, Movies, Writing