

## Young Members Column

### Fahim Mashroor Bhuiyan

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I am Fahim Mashroor Bhuiyan, a fourth-year Ph.D. Student at the University of Nevada Reno (UNR) in the U.S., and I am from Bangladesh. At the start of my undergraduate journey at Bangladesh University of Engineering and Technology (BUET), I chose Civil Engineering as my major. In my final year at BUET, I did my undergraduate thesis on numerical analysis on the raft foundation using Plaxis. To make scrupulous analysis for my thesis, I had to acquire a thorough knowledge of soil and foundation behavior; and concurrently found my passion for geotechnical engineering. I soon realized that the mercurial, erratic, and unpredictable behavior of soil makes this subject more challenging and more fun to learn and work with.

After my graduation, I got a job in a geotechnical engineering firm in Bangladesh. During my brief work experience, I learned to implement load cell technology in static pile load tests. I worked alongside field engineers and learned a lot about implementing engineering knowledge in the geological context of my country. I started my journey at UNR in Fall 2017 under the supervision of Dr. Ramin Motamed who is one of the International Press-in Association's Directors. I started as a master's student in my first semester and helped my colleague in performing shake table experiments to study shallow foundation response due to liquefaction. In Spring 2018, I switched to the Ph.D. program and started working on my current research project. Apart from geotechnical engineering, I have got a keen interest in computer programming and numerical analysis tools. Implementing and refining my programming skills in geotechnical applications have added great flavors to the research project I'm currently working on.

The project I am working on is entitled "Lateral Analysis Guidelines for Drilled Shafts in Nevada Based on LRFD Framework". The project, which is funded by the Nevada Department of Transportation (NDOT), aims at developing a unique, economic, accurate, and validated tool to define LRFD (Load and Resistance Factor Design) based design guidelines for large diameter drilled shaft under lateral loading. Currently, I am trying to implement advanced MATLAB programming to develop a finite-difference tool, NVShaft, to improve the current methodology for numerical lateral load ( $p$ - $y$ ) analysis of large diameter drilled shafts. NVShaft can perform a more sophisticated, unified  $p$ - $y$  analysis by considering additional side shear and tip resistance components more relevant to large diameter drilled shaft. Measured data from several field and centrifuge load tests have been used to validate the new program. Aside from unified  $p$ - $y$  analysis, like other commercial numerical tools, NVShaft can perform axial load ( $t$ - $z$ ) analysis, lateral stability analysis, pushover analysis, and buckling analysis of shaft-column. As of date, a total of 20 lateral resistance ( $p$ - $y$ ) models have been added to the NVShaft library. Several axial side shear ( $t$ - $z$ ), end bearing ( $q$ - $z$ ), tip shear ( $v_b$ - $y_b$ ), and tip moment ( $m_b$ - $\theta_b$ ) resistant models have also been included. Another important goal of our project is to provide a robust definition of shaft point-of-fixity, a parameter that is required for the structural design of bridge pier. By providing the means to perform a more realistic numerical lateral load analysis, the outcome of this research project will result in a more

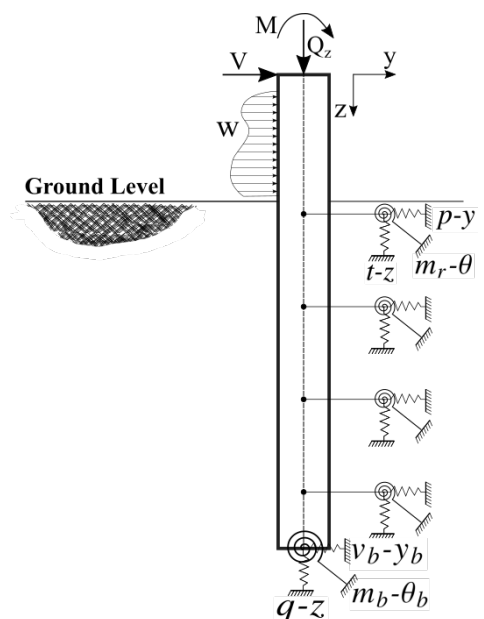


Fig. 1 Numerical Winkler's spring models of major lateral resistance components in large-diameter drilled shaft.

homogeneous design practice and acceptable lateral performance across the state. The project is expected to increase the savings in drilled shafts construction cost as well as improved safety due to more refined analysis and design to be used by foundation engineers.

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## Hoang Thi Lua

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I am Hoang Thi Lua from Vietnam. I am delighted to write this message for the IPA Newsletter to share about myself and my main research areas. After receiving master's degree in Geotechnical Engineering at Thuyloi University – Vietnam, in Sept. 2017, I went to Japan to start my Ph.D. journey. Among many research areas on Geotechnical engineering field, I decided to follow "pile foundation engineering" area because pile foundation is always a reliable and preferred foundation for heavy structures on various types of ground, but also a foundation type with many aspects to investigate. I started doctoral course at Kanazawa University under the supervision of Prof. Matsumoto Tatsunori – one expert in the area of piled raft foundation as well as a Director of IPA. My Ph.D. research topic, therefore, focuses on piled-raft foundations supported by displacement piles - which will be one of the economical and promising foundation solutions for the future construction industry.

In 2020, when I was the last year Ph.D student, Prof. Matsumoto introduced me about IPA. Searching from the internet, I found helpful information related to the IPA and understood how important the Press-in technologies is in the construction industry. Since that time, I registered and became "a student member" of IPA. I also got information about the ICPE 2021, and the topics of ICPE 2021 really attracted me. I decided to submit a paper to the ICPE 2021, and lucky me, my paper was accepted. Thanks to the ICPE 2021, I was kept up with new information on the area of foundations in general and displacement piles in particular. Additionally, I was awarded "The Best research paper of ICPE 2021", this such a great honor for me.

Currently, I graduated Ph.D. course and am now a young lecture at Thuyloi university. I am very interested in researching the application of Press-in technologies on the area of deep foundation in particular as well as in other areas of geotechnical engineering because I strongly believe on prospects of press-in piling in the future. IPA and ICPE are always reliable addresses for me to expand my knowledge, and I think that IPA is the ideal destination for all those interested in Press-in technologies.