Young Professor, Student Paper Awards Presented at Conference

Co-authors Dr. John McCartney and Kyle Murphy, professors at the University of Colorado Boulder, shared honors as winners of the DFI Young Professor Paper Competition award. The paper is titled "Seasonal Strain Distributions in Full-Scale Energy Foundations."

Dr. John McCartney

Kyle Murphy

McCartney received B.S. CE and M.S. CE degrees from the University of Colorado Boulder, and a Ph.D. in civil engineering from the University of Texas at Austin. He is a recipient of the NSF Faculty Early Development Award in 2011. He also received several research awards including the Croes Medal from ASCE in 2012, the Richard S. Ladd D18 Standards Development Award from ASTM in 2011, and the Young IGS Award from the International Geosynthetics Society in 2008.

Murphy is pursuing a M.S. CE at the University, where his research involves thermally active deep foundations under the supervision of Dr. John McCartney. Murphy is a project engineer with Hayward Baker Inc. His B.S. CE is from the University of Missouri. Murphy is a 2011-2012 recipient of the Association of Drilled Shaft Contractors Industry Advancement Fund Scholarship.

Their winning paper focuses on the seasonal thermo-mechanical response of two energy foundations installed at the new Denver Housing Authority Senior Living Facility in Denver. The two drilled shaft foundations, which have diameters of 36 in (0.91m) and depths of 45 ft (13.7 m) and are end bearing in the Denver shale formation, include a closed-loop series of polyethylene tubes through which fluid is circulated to exchange heat with the surrounding ground. The data indicates that typical heat exchange associated with heating and cooling operations leads to strains which are within acceptable limits, and that the foundations can provide a clear option for absorbing the base heating and cooling load for the building.

Honoraria

The awards are funded by the DFI Educational Trust, and the authors of the winning papers receive an honorarium and travel expenses to the Annual Conference site. The Young Professor Paper Competition began in 2005, and the Student Paper Competition in 2003. The two professor awardees presented their paper at the Conference, as did the Student winner, Haijian Fan

Two Student Paper Winners at University of Akron

The Student Paper Competition winner was Haijian Fan, who has a B.E. degree from Shanghai Jiao Tong University, Shanghai, China, and is now a Ph.D. candidate in the civil engineering department at the University of Akron, Ohio. His paper is "Performance-based Reliability Design for Deep Foundations Using Monte Carlo Statistical Methods." Currently, deep foundation designs for the service limit state are deterministic in nature. The noted deficiency of the deterministic approach is that the uncertainties arising from various sources, such as soil properties and model errors are not considered. To address this deficiency, a performance-based reliability design methodology was developed using Monte Carlo statistical methods. The objective of the performance-based reliability design is to determine the optimized foundation dimensions so that the probability of failure is less than the target probability of failure. The probability of failure by the Monte Carlo approach is simply the ratio of the number of unsatisfactory performance to the sample size. A numerical example for laterally loaded drilled shaft is given to illustrate the application of the methodology. The incorporation of the correlation length is shown to be critical for properly accounting for the site soil spatial variability.

Haijian Fan

Lin Li

Lin Li was the runner up Student Paper Competition winner, also from the University of Akron. He is a Ph.D. candidate in civil engineering at the University. Li has an M.S. in structural engineering, Tianjin University, China, and a B.S. in civil engineering, Shandong Jianzhu University, China.

Li's paper is "Reliability Analysis of a Drilled Shaft Stabilized Slope System," and he presents a reliability based analysis method for a drilled shaft stabilized slope system. In the past effort, a deterministic method using the limiting equilibrium method of slices for determining the global factor of safety of a slope reinforced by a row of drilled shafts was developed using the soil arching concept. The drilled shaft stabilization mechanisms for the slope were treated as the drilled shaft induced soil arching, which reduces the driving forces on the down slope side of the drilled shaft. The effect of drilled shafts induced soil arching on the reduction of the driving stresses in the limiting equilibrium slope stability analysis was quantified by the load transfer factor through extensive finite element simulation studies. The developed theories were coded into a computer program for analyzing complex slope geometry and slope profile conditions. Two examples are shown in the paper.

All of the winners will have their papers published in one of the future volumes of the *DFI Journal*.