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PRESENTATION
BY

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"Developing a Graphical User Interface to Improve Learning of Stochastic Theory for Water Resources Education in the Classroom"

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PRESCOTT HALL ROOM 330

In the modeling of natural phenomena in water resources engineering, stochastic theory receives significant emphasis due to heightened awareness of the limitations of deterministic approaches to modeling. Most Civil Engineering degree programs, however, introduce students to the concepts of stochastic theory at the graduate level. This makes it challenging for the fresh graduate student to grasp the theory and successfully implement it in their research experiments in parallel. A computer-assisted graphics-based learning system can potentially enhance the capacity of students to conduct independent research more effectively by training them in computational applications of stochastic theory early in the undergraduate classroom. However, to assess the validity of our assumption that stochastic theory education can be improved through a GUI-based computer instruction and to further identify if current curricula has an inherent demand for such approaches, there is a need to first survey the curriculum that is adopted by the universities nationwide.The objective of this presentation is two fold: i) to gauge the current state of instruction of stochastic theory for water resources in US universities and thereby identify the potential for curriculum improvement and ii) to demonstrate a proof of concept of a computer-assisted Graphical User Interface (GUI) to improve the current state of learning in the classroom of stochastic theory for hydrosciences. Our survey indicates that 84% of the total 241 relevant courses surveyed are available only at the graduate level, while 4.5% and 11.5% were either dual-listed or undergraduate-level courses, respectively. It is worthwhile for the CE educators to consider creating more undergraduate variants of such courses and offer them to students early in their education experience. To further popularize stochastic theory education in context of water resources, more computer-assisted graphics-based schemes should also be used in the undergraduate classroom. The illustration provided herein is a GUI that connects a comprehensive space-time stochastic model for generating rainfall fields that exhibit complex natural variability. Our main finding, based on on-going educational software development, is that effective instructional software building requires evolution from the simplest configuration if its continual upgrade is to continue in liaison with student software developers that are usually available from a computer science department of the university.