CRMSE Colloquium Announcement

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Math, Motion, and Visualization

Friday, January 24, 2014
1:00 – 2:00 pm
6475 Alvarado Road, Suite 128

RSVP: http://crmse.wufoo.com/forms/crmse-colloquia/ or
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Abstract: Dynamics, the study of motion, is a sophomore gateway course in engineering. The Calculus is the principle mathematical tool in this course. However, the primary role of the Calculus belies impediments to learning that arise in this discipline; most notably the reliance on vector algebra. In this presentation, I will summarize these impediments and present a new approach to dynamics that simplifies the discipline. With a colleague at UCSD, I have signed a contract with Pearson Publishing for the publication of a new approach to dynamics that will also be presented as a 3D e-book, which will be viewable on cell phones. The e-book will resemble the animations in the newspapers in the *Harry Potter* movies. I will begin by discussing amusing stumbling blocks in the study of Newtonian Dynamics. I have found that by directly addressing these issues in class, students see that the obstacles that confront them also challenged the creators of the discipline – their feelings are justified; and students gain confidence. The purpose of this introduction is a light-hearted overview of Dynamics. Then I will summarize the mathematical tools and technologies available to enable the study of Dynamics: Lie Algebra and associated Rotation Group (Special Orthogonal and Special Euclidean); moving frames, a new notation and the emergence of the 3D Web. These have been integrated into a new approach that enforces articulation of mathematical tools, alleviates the complexity of the equations, overcomes the restrictions of vector algebra and makes 3D easier than 2D. The new method has been successfully deployed in undergraduate classes at SDSU and in Norway.

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