

# Physics Colloquium

Michigan Technological University

Thursday, March 31, 2011 at 4:00 pm

Room 139 Fisher Hall



## MULTIPLE PERSPECTIVES ON STUDENT SOLUTION METHODS FOR AIR RESISTANCE PROBLEMS

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**Abstract:** Physics Education Research uses multiple theoretical perspectives to describe student reasoning and behavior. Two common lenses are difficulties and knowledge pieces. In the difficulties paradigm, researchers focus on identifying specific topics or questions that pose challenges to students without making claims regarding underlying cognition. In the pieces paradigm, the focus is on describing the structure of student ideas, which are often found to be developed on-the-fly, easy to change, and can be described as made up of chunks of knowledge that are not inherently correct or incorrect. I use these lenses to examine the methods students use when solving first order separable differential equations in the context of air resistance problems and discuss several difficulties students have when incorporating boundary conditions. Additionally, using air resistance as a context, I expand upon resources, a model of student thinking that falls into the pieces paradigm, introducing procedural resources as a type of resource and giving several examples of procedural resources used in the incorporation of boundary conditions. Finally, I extend existing links between the resources model and epistemic games, script-like activities used to describe the creation of new knowledge.

**Bio:** Katrina Black earned a BS in Physics from Michigan Technological University in 2003 and a PhD in Physics in the area of physics education research from the University of Maine in 2010. She worked as a Postdoc with the University of Maine's Research in STEM Education (RiSE) Center as part of an MSP grant intended to reform grade six through nine physical science curriculum and establish a strong teacher community among 48 rural middle and high schools. Her research interests include modeling student cognition, modes of effective curricular reform, and sustainable human-scale systems.

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