

Abstract Submitted
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How Physicists Communicate Conceptual Meaning with Math

SCOTT FRANKLIN, Rochester Institute of Technology — Physics embeds conceptual meaning within a complex mathematical formalism. In this talk, I present a discourse analysis of faculty teaching with mathematical derivations, rearranging and simplifying equations to illuminate physical principles. Observations are interpreted through the lens of symbolic forms, conceptual and contextual meanings that are embedded in the equation. As an equation is manipulated, different forms are emphasized, subtly changing the physical interpretation. The symbolic forms framework can make explicit the motivations behind the mathematical “moves” in a derivation. Some manipulations change the dominant context from physics to mathematics. Other thematic manipulations — e.g. grouping terms of a common variable — reveal important conceptual points. While direct observational evidence supports the inference of these motivations, the reasoning is often hidden from the students. The study of mathematical discourse represents a new direction in which physics education researchers can study and inform the classroom.

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