1147-65-633 **Andrew Gillette*** (agillette@math.arizona.edu), **Tyler Kloefkorn** (tkloefkorn@math.arizona.edu) and **Victoria Sanders** (victoriasanders@email.arizona.edu). *How to speed up your tensor product finite element code without really trying.*

Serendipity finite element methods present a promising computational advantage over traditional tensor product finite elements: a significant reduction in degrees of freedom without sacrificing the order of accuracy in the computed solution. The theory of serendipity methods dates back to the 1970s but has seen a resurgence of interest in recent years within the context of finite element exterior calculus and the Periodic Table of the Finite Elements. In this talk, I will discuss current efforts to seamlessly incorporate serendipity elements into existing software packages – including deal.ii and Firedrake – so that a user would simply have to "select" an appropriate, more efficient serendipity element when desired. While the end goal is truly "speedup without trying," there are still mathematical and implementation challenges that must be addressed. I will discuss the state of the art in this area in the context of my recent work with Tyler Kloefkorn and undergraduate math major Victoria Sanders. (Received January 27, 2019)