

Contribution ID: 164

Type: **Oral Presentation**

Modelling with data in an introductory numerical methods course

Thursday, 12 July 2018 15:00 (30 minutes)

Modelling with real data in the classroom not only gives students a sense of why the mathematics matters, but it also gives them perspective on how messy the real world is and how we adapt our models to suit non-perfect data. We present a class activity and project for an introductory numerical methods course in which Calculus 1 and 2 are prerequisites. In the classroom we introduce curvature and a method for calculating curvature using discrete points. We then explore how we could use curvature to identify sinkholes given data from high resolution digital elevation models (DEMs). Outside of class, groups of students create codes in Matlab to calculate the curvature at each boundary point of some given depression. Each group then decides how to use these individual curvatures to determine whether a depression is a sinkhole. Once all projects are complete the students present their methods in class and test their codes on actual geological data. Although this project is geological in nature, it could be used with any application in which identification is based on roundness.

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Session Classification: Interdisciplinary curriculum development at the interface of mathematics, life science, and computing; challenges and progress

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