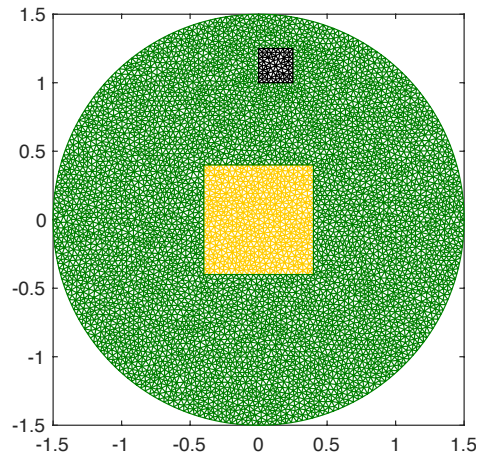


# Student Research Talks (StReeTs)

George Mason University

## External Optimal Control of Fractional Parabolic PDEs

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### Abstract

In this talk, we introduce a new notion of optimal control, or source identification in inverse, problems with fractional parabolic PDEs as constraints. This new notion allows a source/control placement outside the domain where the PDE is fulfilled. We tackle the Dirichlet, the Neumann and the Robin cases. The need for these novel optimal control concepts stems from the fact that the classical PDE models only allow placing the source/control either on the boundary or in the interior where the PDE is satisfied. However, the nonlocal behavior of the fractional operator now allows placing the control in the exterior. We introduce the notions of weak and very-weak solutions to the parabolic Dirichlet problem. We present an approach on how to approximate the parabolic Dirichlet solutions by the parabolic Robin solutions (with convergence rates). A complete analysis for the Dirichlet and Robin optimal control problems has been discussed. The numerical examples confirm our theoretical findings and further illustrate the potential benefits of nonlocal models over the local ones.

Date: Friday, October 11, 2019

Time: 2:30pm–3:20pm

Place: Exploratory Hall 4106

**Pizza and soda will be served at the presentation.**

For further information or for special accommodations (including dietary restrictions), please contact Tracey Oellerich or Cigole Thomas via email at [toelleri@gmu.edu](mailto:toelleri@gmu.edu) or [cthoma40@gmu.edu](mailto:cthoma40@gmu.edu) by Thursday.