

# Mathematical Sciences

Fall 2021

## Colloquium Series

**Dr. S. M. Mallikarjunaiah**

Texas A&M University – Corpus Christi

∴ Online (Zoom) Meeting ∴

∴ Friday, November 5 ∴ 3pm ∴

*Click on this announcement to access the Zoom link*

### On a Finite Element Discretization of a Regularized Phase-field Model for Quasi-static Crack Evolution in Nonlinear Strain-limiting Elastic Bodies

#### Abstract

In this talk, we discuss a phase-field model for quasi-static crack propagation in nonlinear strain-limiting elastic bodies. Our goal is to formulate a diffuse interface approach for the initiation and growth of a single crack in an elastic material that is governed by a special constitutive relationship. Such a setting yields physically reasonable crack-tip fields which are well within the basic assumptions used in the derivation of the model. A quasi-static evolution problem is formulated as a minimization of total energy functional based on Griffith's criterion. The coupled system consists of two nonlinear second order elliptic partial differential equations. The discretized coupled system is solved by a monolithic Newton-Raphson iterative algorithm. The efficacy of the model is demonstrated by several numerical results.

\* This is a joint work with Dr. Hyun C. Yoon (KIGAM, South Korea) and Dr. Sanghyun Lee (Florida State University, Tallahassee, Florida)

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