SOUTH DAKOTA MINES
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THURSDAY, OCTOBER 29 2:00-2:50 PM

ME Research Seminar

High Order Positivity Preserving Finite Difference Scheme for Compressible Two Fluid/Phase Flow Model

DANIEL BOE, MS STUDENT
SOUTH DAKOTA MINES

Daniel Boe is a second year Mechanical Engineering Master's student studying under Dr. Khosro Shahbazi. His research is focused upon high order positivity-preserving finite difference schemes applied to two-fluid compressible flow. Daniel obtained his BS in ME from South Dakota Mines in 2019. In addition to his graduate studies, Daniel is employed by Global Health Labs in Bellevue, WA. His primary interests are in numerical methods, computational fluid dynamics, machine learning, data science, and novel refrigeration systems.

THURSDAY 10/29 2-2:50 PM
Live *Zoom!* LINK: tiny.cc/MinesF20
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In any numerical modeling, it is essential that the model abide by the physical constraints of the system without introducing unphysical spurious solutions. For the case of compressible two phase/fluid flow, in order to obtain a stable, physical solution, we need to methodically enforce positivity of both density and the square of sound speed. Two phase/fluid problems are highly nonlinear and are characterized by shocks, complex wave propagation, and large interface discontinuities that pose distinct challenges to numerical algorithms. All previous numerical schemes for such flows lack robustness in that they yield a negative square of sound speed, making the computation impossible. In this talk, I will discuss our proposed high order Weighted Essentially Non-Oscillatory (WENO) finite difference scheme that utilizes a flux limiting technique to achieve positivity preservation. Our scheme overcomes the lack of robustness in the previous numerical schemes, and thus, enables solutions for complex two-phase flows involving shock-waves and two-phase material interfaces.