



THE UNIVERSITY OF ARIZONA

College of Engineering

Aerospace and Mechanical Engineering Seminar

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Numerical Caseology by Lagrange Interpolation for the 1D Neutron Transport Equation in a Half-Space

Abstract: Today's seminar concerns a new numerical solution to the 1D neutron transport equation based on Ken Case's singular eigenfunction expansion (SEE). We will initially consider the origin of the neutron transport equation to be solved in a half-space. While many numerical solutions currently exist, understandably, because of its complexity, there are only a handful of analytical solutions, the most prominent being the singular eigenfunction expansion. In 1960, K. Case introduced the SEE solution, called Caseology, for a variety of common transport problems and forever changed the landscape of analytical neutron transport theory. Several numerical methods were built upon the core of the SEE, but few were particularly straightforward as the one presented here. We will review Caseology, present the Lagrangian polynomial basis solution and some benchmark results.

Bio: Professor, Department of Aerospace and Mechanical (AME) Engineering at the University of Arizona since 1976. I teach a variety of courses including numerical methods to juniors, Nuclear Reactor Physics to seniors, senior seminar and currently offer Engineering Mathematics online to graduates in our Masters of Engineering program. I have held visiting professorships in nuclear programs at MIT, Texas A&M University, University of New Mexico, University of Tennessee and University of Bologna. In addition, I have performed research at five national laboratories, two NASA Centers and three military laboratories. I completed my undergraduate degree at UC Berkeley in mechanical engineering, MS at Columbia University in Nuclear Engineering and PhD in Engineering Science at UC Berkeley in 1971. In 2008, I received the De Vinci Award for research, teaching and service from the College of Engineering. I am a Fellow of the American Nuclear Society.

Thursday, January 28, 2021

Zoom Link: Contact eperumala@arizona.edu