

Seminars TOPICS and ABSTRACTS

Seminar Topic: Fluid Flow and Heat Transfer in Rotating Porous Media (including “The Princess and the Pea”).

by: Peter Vadasz, Professor of Mechanical Engineering,
Northern Arizona University

Abstract:

The fundamental theory of flow and thermal convection in porous media is developed and a systematic classification and identification of the relevant problems is introduced. An initial distinction between rotating flows in isothermal porous systems and natural convection in non-isothermal porous systems provides the two major classes of problems to be considered. Examples of solutions to selected problems are presented, highlighting the significant impact of rotation on the flow in porous media. In the isothermal case the validity of the Taylor-Proudman Theorem to flows in porous media is demonstrated theoretically as well as experimentally (the experimental setup nicknamed: “*The Princess and the Pea*”).

Seminar Topic: The Weirdest Phenomena in Sciences.

by: Peter Vadasz, Professor of Mechanical Engineering,
Northern Arizona University

Abstract:

Some of the weirdest phenomena in sciences are rigorously introduced and discussed. They include topics such as “**invisible objects**”, “**relativity theory vs. absolutism theory**”, “**premonition and Larmor radiation**”, “**the big brother and quantum mechanics**”, “**telekinesis and quantum entanglement**”, “**zombies and Schrödinger’s cat**”.

Seminar Topic: Engineering Modeling of Nonlinear Systems (including “Romeo and Juliet and Spaghetti”, and a “nuclear blast” experiment in class).

by: Peter Vadasz, Professor of Mechanical Engineering,
Northern Arizona University

Abstract:

An introduction to engineering modeling, consisting of physical and mathematical modeling, is presented via simple examples. The wind tunnel is introduced as an example of physical modeling and similarity, followed by an example of nuclear blast experiment conducted in class (or in the lab). Then the problem of optimal resources allocation subject to altruistic conditions (nicknamed: *Romeo and Juliet and Spaghetti*) is presented as an example of mathematical modeling and addressing its pitfalls.