NJIT mathematician to study thin film science

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Ever wonder how manufacturers produce the thinnest and finest materials for cell phone displays and even smaller electronic products? If so, you are entering the burgeoning new world of "thin film" science and the life work of theoretical physicist and applied mathematician Lou Kondic, PhD, associate professor, department of mathematics at New Jersey Institute of Technology (NJIT).

Kondic recently received a 2005-2006 Fulbright Scholar grant to study a dimension of thin film science focusing on the thinnest fluids. Kondic will travel next spring to Argentina for three months, where he will help physicists discover better ways to coat very delicate, almost invisible glass fibers. For almost two decades, scientists around the world have been searching for better polymers (more commonly known as plastics) to accomplish this task. These fibers are used to conduct electrical signals in microelectronics, optics and nanotechnology applications.

Interest in thin film science has sky-rocketed because of recent scientific and technological breakthroughs. Aside from coating glass fibers, these new thin microscopic coatings are used to enhance the durability of products ranging from the outer covering of NASA space ships to army tanks in Iraq.

In Argentina, Kondic will focus on how polymers are used to create a thin coating of a fluid film around an existing surface. Scientists consider fluids made of polymers to be complex. "My research will concentrate," said Kondic, "on the instabilities and patterns that form

during the flows of these complex thin films."

Kondic's work especially interests researchers in the computer industry who want to know more about how to reach uniform coverage of a rotating silicon surface with a thin film polymer. Kondic hopes his work in Argentina will shed more light.

To achieve results, Kondic will use large scale numerical simulations to analyze the problems and find solutions. These simulations will be performed on a large computer located at NJIT, purchased with funds from the National Science Foundation.

This kind of work is often referred to as mathematical modeling. Mathematical modelers, like Kondic, formulate mathematical equations that are believed to describe physical, biological, or sociological phenomena. The modelers take the known and accepted formulas of physics and/or chemistry and create mathematical equations that described unexplained phenomenon--such as why two fluids may adhere. While mathematical modeling may not always validate a fundamental physical or chemical principle, if the answer matches most of the presumed data, then researchers know they may be on the right path. Scientists in many fields, including biology, chemistry, physics, and engineering use mathematical modeling in their research. Economists, sociologists, and political scientists also utilize sophisticated mathematical modeling to deal with detailed problems associated with human behavior.

Kondic is the author of more than 50 research articles. His most recent scholarly article, "On Nontrivial Traveling Waves in Thin Film Flows, Including Contact Lines" appeared in September of 2005 in Physica D. The National Science Foundation, NASA and the International Exchange of Scholars have supported Kondic's work. Kondic received his doctorate in physics from City College of City University of New York.

Source: New Jersey Institute of Technology