INDIAN WOMEN AND MATHEMATICS

May 12: Celebrating Women in Mathematics

You are cordially invited to a lecture

by

Professor Barbara Lee Keyfitz
The Ohio State University

on

Partial Differential Equations, A Way to Get from Here to There

Friday, 3rd June, 2022 at 6:30 PM (IST)

Please join via Zoom
https://iitk-ac-in.zoom.us/j/93088770067?pwd=YUsrK2kySHFnSFowbGFYMElYd2JlQT09

Meeting ID: 930 8877 0067, Passcode: 608118

YouTube
https://youtu.be/Gr-8fywEing

ABSTRACT

Partial Differential Equations - PDE - may seem like a specialized area of mathematics, often not taught in the standard undergraduate curriculum, or relegated to a vague area called “applied mathematics”. But in fact the subject has a rich history, and for more than 200 years has motivated the development of many other branches of mathematics.

Anyone who knows how to differentiate and integrate a function can solve a partial differential equation; the purpose of this talk is to encourage people to explore how to do this and to think about what solutions mean.

A PDE, as its name suggests, is an equation that involves a function of two or more variables and its derivatives in those variables. For example, think of the air temperature as a function of time and space. The temperature at some location is likely to increase in time if the surroundings are hotter. That statement relates change of temperature with time to the gradient of temperature in space (the gradient is the derivative in space). Making that precise results in the heat equation. The power of PDE is that you can use this information - call it local information - to get information about how the temperature will vary over a larger amount of space - in fact, over the entire planet. Solving a PDE takes one from “local” to “global”.

That is why scientists and engineers (and economists and ecologists) are interested in PDE, and that’s where the subject got the name “applied mathematics”. But PDE are also part of core mathematics. In fact, much of what we call core mathematics today - real and complex analysis, approximation theory and geometry - was developed so that people could solve and understand PDE. And much of scientific computing centers on how to compute and visualize solutions of PDE, since for the most part one can’t represent solutions in terms of standard, known functions.

In this talk, I will start with the simplest equations and show several ways to solve them. PDEs have a lot of algebraic structure, and the algebra conveys valuable information about the solutions. There are equations with very badly behaved solutions, and some equations with no solutions at all. The last part of the talk will be about some of my recent research that shows unexpected connections between solutions of two very different-looking equations.

About the Speaker

Barbara Lee Keyfitz is Professor of Mathematics at the Ohio State University, which she joined in January 2009, after 21 years at the University of Houston and four and a half years as Director of the Fields Institute in Toronto, Canada.

Barbara Keyfitz received her undergraduate education at the University of Toronto and her M.S. and Ph.D. from the Courant Institute, New York University. Her research area is Nonlinear Partial Differential Equations.

Keyfitz is a SIAM Fellow, a Fellow of the American Association for the Advancement of Science, a Fellow of the American Mathematical Society, a Fellow of the Fields Institute, and the recipient of the 2012 SIAM Award for Distinguished Service to the Profession. She has served on the editorial boards of the AMS Proceedings, the AMS Transactions, JMAA, SIAM Journal of Applied Mathematics, Mathematical Methods in the Applied Sciences, Fields Institute Monographs and Communications, Chinese Journal of Engineering Mathematics, and as a member of the Mathematical Reviews Editorial Committee.

In 2012 she was the Noether Lecturer at the Joint Mathematics Meetings, and the Kovalevsky Lecturer at the SIAM Annual Meeting. She received the 2005 Krieger-Nelson Prize of the Canadian Mathematical Society, and an Honorary Doctor of Mathematics degree (2010) from the University of Waterloo.

She was President of the Association for Women in Mathematics in 2005-2006, and was a Vice-President of SIAM, 1998-2003, and of the American Mathematical Society from 2011-2014. From 2011-2015 she served as President of the International Council on Industrial and Applied Mathematics.