MONOTONE ITERATIVE TECHNIQUES

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Overview

The Iterative methods are fundamental tools in order to ensure the existence of solutions of Nonlinear Boundary Value Problems. This theory is valid both for Ordinary and Partial Differential Equations.

Such theory is strongly related to the method of lower and upper solutions, which allows us to ensure the existence of a solution of the considered problem lying between a pair of ordered functions that satisfy some suitable inequalities. In particular, we have information not only about the existence of solutions, but also about the location of some of them.

The combination of the lower and upper solutions method with monotone iterative techniques allow us to approximate the given solutions and, in some particular cases, obtain their exact expression.

It is important to note that this recursive method has also a deep dependence on comparison results for suitable linear operators. Such comparison results are equivalent to the constant sign of the kernel of the related integral operator, the so called Green's function. To apply such theory to a particular problem, we must study the sign of such function. Since to calculate the expression of these functions is, in general, very complicated, we have developed a Mathematica package where the exact expression of the Green's function is obtained when the coefficients of the linear equation are constant. Even in such a case, the obtained expressions are very complicated to deal with. Is for this that, by means of spectral theory, we can give the exact value of the parameters for which such Green's function has constant sign without calculate their exact expression, even if non constant coefficients are considered.

Course participants will learn these topics through lectures and tutorials.

Modules	MONOTONE ITERATIVE TECHNIQUES : Nov 5 - Nov 11 **Number of participants for the course will be limited to 25.**
You Should Attend If…	▪ Professors and researchers in Mathematics interested in the analysis of Nonlinear Differential Equations. ▪ Student students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry/ Research Organizations: Rs 3000** **Academic Institutions: Rs 1000** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility.

The Faculty

Dr. Alberto Cabada is a Professor and Head of Institute of Mathematics at the University of Santiago de Compostela. His line of research is devoted to nonlinear differential equations. He uses methods which are based on topological methods and iterative techniques. He is the author of more than 137 research articles indexed in the Citation Index Report. Listed as one of the most cited mathematicians of the world according to the Essential Science Indicators of the Institute of Scientific Information (ISI) of Philadelphia. His Hirsch index (h-index) is, according to the institute, h = 24.

Dr. Amit Kumar Verma is Assistant Professor at Indian Institute of Technology, Patna. His research interest is Analysis of Nonlinear Differential Equations, Numerical Solutions of nonlinear ODEs and PDEs.

Course Co-ordinator

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