Global Climate Change and Fredholm Integral Equation of the First Kind

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May 18, 2000
102 Bradley Hall, 4:00 pm
(Tea 3:30 pm Math Lounge)

Abstract

The Earth's upper atmosphere (10-15 km above the surface) is thin, fragile and almost invisible. Yet it plays a fundamental role in global climate and provides a shield from harmful ultraviolet radiation from the sun.

This talk will focus on the mathematical techniques needed to perform the geophysical data extraction aspect of satellite experiments designed to obtain a better understanding of the complex physical and chemical processes that control upper atmosphere structure and variability. Measurements made by satellite instruments are usually not direct measurements of the desired geophysical variables but are related to them by integral equations and are further contaminated by noise. The problem of retrieving these variables from the measurements is in general, an ill-conditioned and ill-posed inverse problem. We describe the development of a retrieval algorithm and its application to the specific case of the CLAES instrument on-board the Upper Atmospheric Research Satellite which was launched in September 1991. This experiment is the spearhead of a long-term program of space based research into global atmospheric change.

This talk should be accessible to undergraduates.