

# Inverse Problems

**Presenters:** Dr Stuart Anderson  
DSTO

**Date:** 15th March 2007  
4:00pm–6:00pm

**Venue:** SA Water Lecture Theatre  
Mawson Centre  
Mawson Lakes Blvd  
(Library Building)  
Mawson Lakes SA

## Abstract

Inverse problems arise whenever we try to interpret observations of the external world, either by virtue of our instruments with their intrinsic sampling and transfer functions, or because the measurements consist of integrals of the desired quantity even before the signals pass through our instruments. The disciplines we know as remote sensing, imaging tomography, electromagnetic prospecting, radar target classification, radio astronomy, photographic image restoration and many others rely, knowingly or unknowingly, on solving inverse problems.

It is an interesting characteristic of our university training as scientists and engineers that we are much more familiar with techniques for solving direct (or forward) problems than inverse problems, yet many of us confront the latter far more frequently than the former. In part this bias is due to the mathematical properties of inverse problems, in particular the fact that they are ill-posed in the sense of Hadamard, that is, they violate one or more of the conditions of existence, uniqueness and stability. Surprisingly, recognition of the consequences of ill-posedness in practical problems and development of robust techniques for dealing with them did not occur until the 1950's and 1960's with the work of Tikhonov and others. Recent years have seen many advances in the field, with publication of numerous books and two major journals devoted to the subject.

This talk will provide an overview of inverse problems, a taxonomy of the main classes, a little formal theory and a number of practical examples and illustrations.

## Presenter

Dr Stuart Anderson is a Principal Research Scientist in the Australian Defence Science and Technology Organisation, where he was responsible for developing the ocean surveillance and remote sensing capabilities of the Jindalee over-the-horizon radar system. He has worked as a visiting scientist in several countries, and continues to serve as a consultant to various national and international HF radar programs, as well as holding adjunct appointments at Curtin University of Technology (Professor of Applied Physics) and the University of New South Wales (Professor of Mathematics). His active research interests include electromagnetic scattering, radio oceanography, ionospheric physics, adaptive signal processing, microwave radar polarimetry and the design of HF radar systems for a wide variety of missions.

## Bookings Essential

Please RSVP by no later than  
8 March, 2007:

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## Format of the Seminar

16:00–17:00 Presentation  
SA Water Lecture Theatre  
(MC1-02)  
17:00–18:00 Drinks and Refreshments  
Exhibition Space  
(MC1-14)