Microlocal Analysis in radar and seismic imaging

Cliff Nolan, University of Limerick

Abstract: In this talk we consider data acquisition geometries which are applicable to both radar and seismic imaging. What seems like a cosmetic change in how one acquires (or synthetically pre-processes) the data can have a dramatic effect on the image one obtains when performing standard back-projection, or almost any other imaging method that one cares to consider. Microlocal analysis is the perfect tool to analyse the (back-projected) image and identify whether or not one should expect artefacts to appear. We will use this approach to analyse the images obtained from Common-Midpoint and Common-Offset acquisition geometries. While both data have the same number of degrees of freedom associated with them, the resulting images are not so comparable. We will use microlocal analysis to show that one can expect better images from the Common-Offset image and explain the mechanism responsible for the artefacts that appear in the Common-Midpoint image. If time permits, I will also link the analysis to some other acquisition geometries in both radar and seismic imaging.