1035-74-1955 **George Roy*** (groy@NRCan.gc.ca), 568 Booth Street, Ottawa, Ontario K1A 0G1, Canada.

Determination of Stress Tensor by Wavelet Analysis. Preliminary report.

Real materials are subjected to deformations, regarded mathematically as a homotopic family of differential. The deformation can be adequately described by a strain tensor viewed mathematically as a Lie derivative of the homotopy. Therefore, the resultant state of stress of importance to structural stability of the material must be deduced from the strain tensor. There are several methods to measure the strain tensor, but the most important non-destructive one is X-ray Diffraction method. It is based on quantum mechanical assumptions, but its major features can be cast in the form of mathematical transformations. If a constitutive equation, relating the strain and stress tensors, determined experimentally from crystallographic measurements, is provided, the state of stress can be calculated from the constitutive equation. Since the signal is non-parametric and probabilistic, Wavelet Analysis (WA) is a good mathematical tool to carry it out. In the paper to be submitted, the WA approach is presented as the best available approximation to the signal, and it will be demonstrated how the analysis is carried out to minimize the error. It will be shown how the engineering world will benefit from the novel method of stress measurement in a variety of existing and future materials. (Received September 20, 2007)