

Lab Note: 1

Thank you very much for your donations. This funding will provide essential support towards the development and completion of this research effort.

I have started my research plan. The objectives of this research can be subdivided into four major categories:

- (1) Record AE guided wave from fatigue crack experiments
- (2) Develop an inverse algorithm to calculate source potentials
- (3) Characterize the crack based on the released energy information
- (4) Solve a forward problem to simulate the AE signal using the source obtained experimentally.

I am emphasizing task 1 in this lab note.

Task 1: Experiments. An AE experiment will be designed to measure the acoustic emissions from the fatigue crack growth. A test specimen will be made of 2 mm thick 304-steel material. A small hole (1 mm diameter) will be drilled at the center of the specimen to initiate the fatigue crack. The specimen will be subjected to the cyclic loadings by using the hydraulic MTS machine. A relatively higher loading intensity ($\sigma_{\max} = 65\%$ of yield strength) and stress ratio ($R = \sigma_{\max} / \sigma_{\min} = 10$) will be used for the fatigue crack growth. The AE sensor will be attached to the specimen to capture the acoustic emission signals. The AE instruments record the signals as AE waveforms.

Next note will be uploaded, once I prepare the experimental setup.