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Acoustic Emission Source Location Experiment on a Carbon Fiber Woven Fabric Plate

Experiment Setup

Four AE sensors with operation frequency between 100-400 kHz and resonance frequency at 200 kHz were mounted on a carbon fiber woven fabric plate with a distance of 600 mm between each sensor (see Figures 1 and 2). Four sensors with 60 dB preamplifiers were connected to the AE device. The coordinates of the sensors are given in Table 1. The carbon fiber plate is a composed of carbon tows woven with a plain weave style pre-impregnated with B-staged epoxy resin (0.2 mm thickness per tow). The dimensions of the plate are 650 x 650 x 2 mm^3.

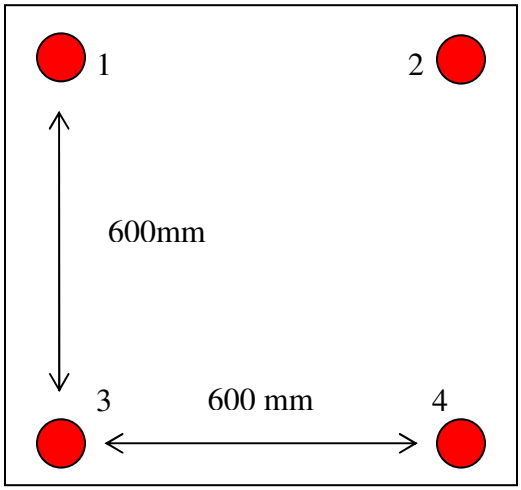

Figure 1. Diagram of the experiment.

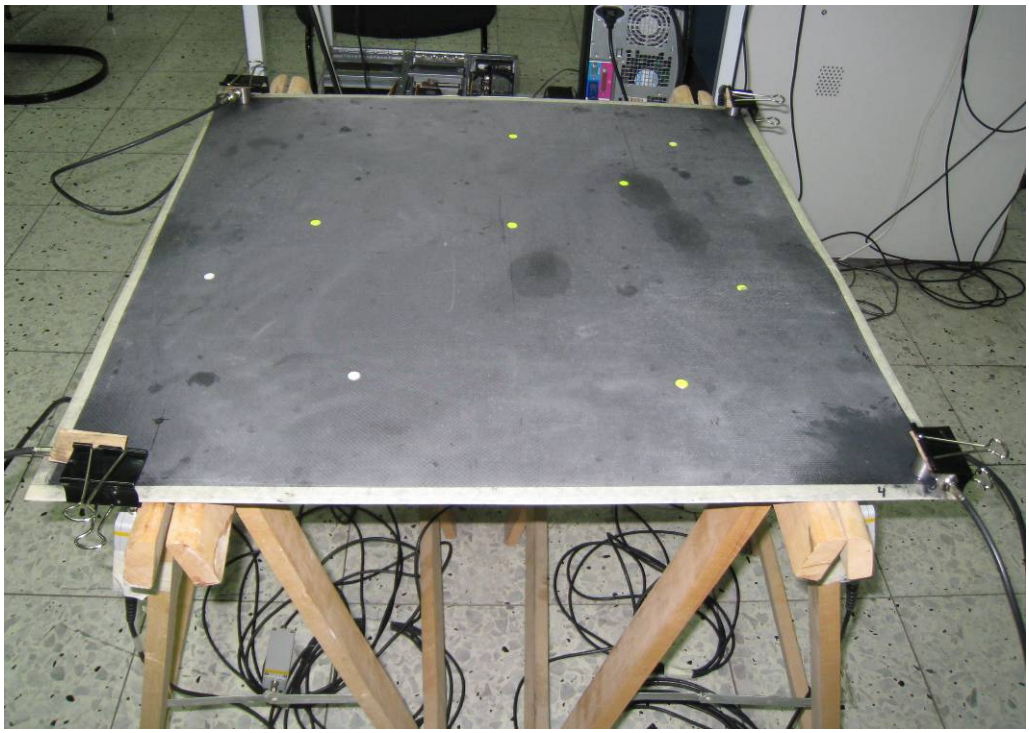

Figure 2. Picture of experiment setup.

Table 1. Sensors location coordinates.

	X Coordinate (mm)	**Y Coordinate (mm)**
Sensor 1	0	600
Sensor 2	600	600
Sensor 3	0	0
Sensor 4	600	0

Hardware Setup

The hardware setup used for the experiments is shown in Table 2:

Table 2. Hardware Setup.

	Analog Filter		**Waveform Setup**		
Threshold	Lower	Upper	Sample Rate	Pre-Trigger	Waveform Length
30dB	100 kHz	2,000 kHz.	2MSPS	256 μs	15K

Experiment Procedure

Pencil lead break was used as a source of acoustic emission signals. Six lead breaks were initiated in 9 different locations and the waveforms were recorded on the AE device. The coordinates of the lead break sources are given in Table 3 and shown in Figure 3. For3 sources a location was calculated using standard software of the AE device.

Table 3. Location of source coordinates.

	X Coordinate (mm)	Y Coordinate (mm)	Folder Name
Source 1	0	600	Location 0 600
Source 2	600	600	Location 600 600
Source 3	0	0	Location 0 0
Source 4	600	0	Location 600 0
Source 5	300	300	Location 300 300
Source 6	450	450	Location 450 450
Source 7	550	550	Location 550 550
Source 8	450	300	Location 450 300
Source 9	600	300	Location 600 300

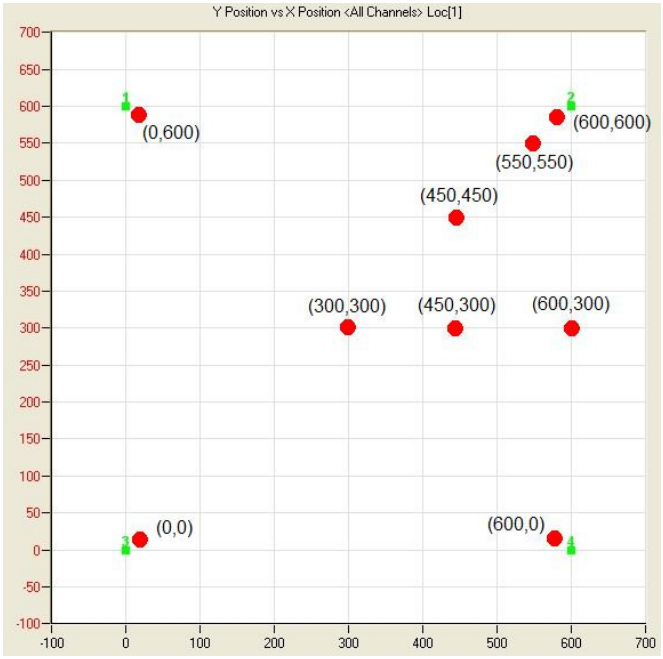

Figure 3: Location of the Sources.