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Detection and Analysis of the Magnetic Field Component of Electromagnetic Radiation Emission from Macroscopic Fracturing of Cement-Bound Granular Material PAUL IVAN CERALDE, JOEL TIU MAQUILING, Geophysics Research Laboratory, Department of Physics, School of Science and Engineering, Ateneo de Manila University — This study aims to detect and measure the magnetic field component of the Electromagnetic Radiation (EMR) emitted by quasi-brittle materials that undergo macroscopic fracturing. Cement-Bound Granular Materials (CBGM) were prepared by mixing cement, sand and gravel in a beam mold. Additional aggregates in the form of saw dust were added to produce variable CBGM samples. A concrete beam holder was designed and fabricated such that induced cracks from impact loading would form at the center of the beam. Six Vernier software magnetic field sensors were used to detect the magnetic field (MF) component of the EMR emission. The magnetic field sensors were set at a low amplification range ($6.4\text{x}10^{-3}$ T) setting with 0.0002 mT precision at 20-50 Hz. Sensor locations and orientations were specified and fixed throughout the experiment. The impact loading process was repeated until concrete failure. The time of drop was determined through the occurrence of peak sound levels (dB) induced by the collision noise using a sound level meter at fast time weighting. Magnetic field fluctuations manifesting near the occurrence of sound level impulses were recorded. Peak magnetic field values within 200ms from the recorded time of impact were considered to be originating from the concrete fracture.

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