



## Development of Fatigue Damage Evaluation Method for Composite Pressure Vessel using Acoustic Emission

Hiroki ORITO<sup>1</sup>, and Takuma MATSUO<sup>2</sup>

<sup>1</sup> Department of Mechanical Engineering, Graduate School of Science and Technology, Meiji University  
\*1-1-1 Higashi-mita Tama-ku, Kawasaki-shi, Kanagawa, 214-8571, Japan  
[ce182019@meiji.ac.jp](mailto:ce182019@meiji.ac.jp), +81-44-934-7737

<sup>2</sup> Department of Mechanical Engineering, School of Science and Technology, Meiji University,  
\* 1-1-1 Higashi-Mita, Tama-ku, Kawasaki-shi, Kanagawa, 214-8571, Japan  
[matsuo@meiji.ac.jp](mailto:matsuo@meiji.ac.jp), +81-44-934-7737

### *Abstract*

Hydrogen energy is one of the clean energy sources, and is expected to be part of the next generation of energy. Recently, many hydrogen stations for vehicles have been constructed in Japan. These stations utilize Type-III composite vessels that are high intensity and lightweight for hydrogen storage tanks. However, the inspection for fatigue cracks in the aluminum layer is difficult because of the surface carbon fiber reinforced plastic (CFRP) layer. In this study, the acoustic emission (AE) method was applied for the condition-monitoring of the vessel. A bending fatigue test was conducted on a three-layered flat plate simulating a hydrogen tank. The characteristics of the AE signals varied in accordance with the damage type, and the AE signals of fatigue crack propagation were classified.

**Keywords:** Acoustic Emission, Composite pressure vessel, Fatigue, health monitoring