Data Acquisition for Abnormality Detection using an Experimental Bogie on Test Track

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Abstract

Actual data on the state of the vehicle leading to derailment is necessary for research on the detection of derailment signs of railway vehicles. In this paper, the acquisition of data on the state leading to wheel climb of the experimental bogie is described.

Keywords: wheel, climb, rail, data, experiment.

1   Introduction

In order to improve the safety of railways, the authors are conducting research on the detection of derailment signs of railway vehicles. In conducting research, it would be useful to have actual data on the phenomena leading to derailment in order to verify the developed derailment sign detection system. However, there are not many actual data on the state leading to derailment. If there is actual data on the state leading to derailment or a state close to it, it will be useful for research to improve the safety of railways.

2   Methods

A wheel climb test with experimental bogie was conducted on a railway test track with R30 class curve section, which was newly operated at the University of Tokyo. Under normal conditions, the experimental bogie does not wheel climb and derailment. By adding an additional load and changing the balance of the wheel load significantly, the wheel climb occurred. The experimental bogie was equipped with sensors for collecting data. Figure 1 shows the experimental train under normal conditions.

Figure 1: The experimental train under normal conditions.

3   Results

The experimental train under normal conditions can normally pass through the R30 curve section (figure 2). On the other hand, the experimental train which the balance of the wheel load was significantly changed, cannot pass through the R30 curve section. That is, a wheel climb occurred and hit with a derailment prevention guard (figure 3). Figure 4 shows an example data including the wheel climb.

Figure 2: The experimental train under normal conditions can normally pass through the R30 curve section.

Figure 3: The experimental train under wheel load unbalance conditions cannot pass through the R30 curve section (wheel climb).
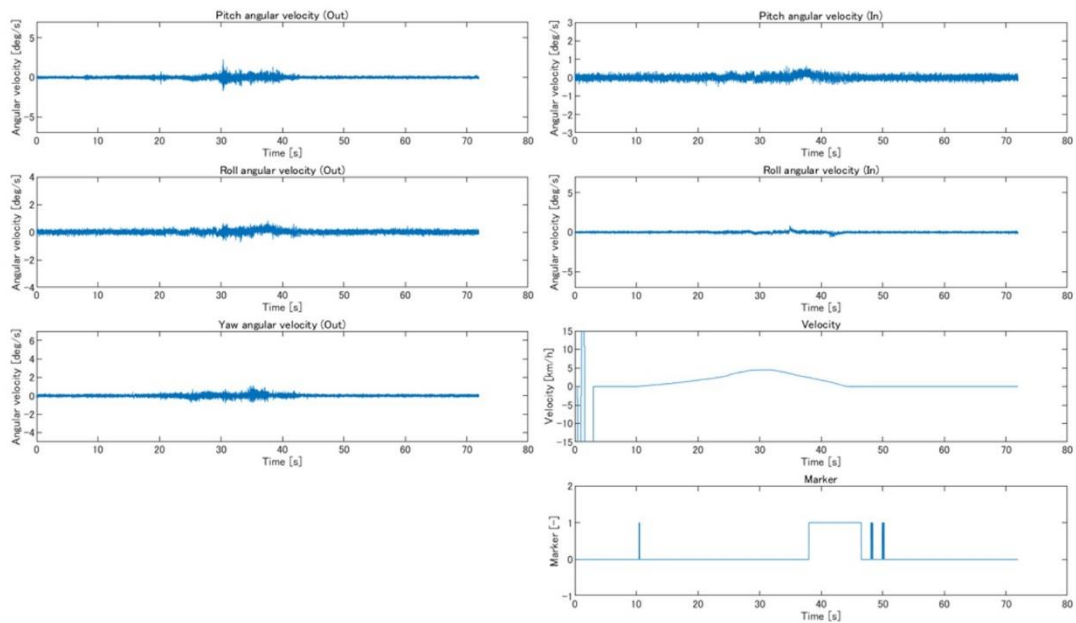
Figure 4: An example data including wheel climb.

4   Conclusions and Contributions

The actual data of the state leading to or close to the wheel climb derailment is useful for research to improve the safety of railways. A wheel climb test with experimental bogie was conducted on a railway test track with R30 class curve section, which was newly operated at the University of Tokyo. The actual data were acquired in the normal state and in the state where wheel climb occurred. These data will be used for validation of the derailment sign detection system.

References

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