The Analysis and Creation of Track Irregularities Using TRAKVU

by

Kenneth P. Kramp

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Approved:

______________________
Mehdi Ahmadian, Chairman

______________________
Daniel J. Inman

______________________
Alfred L. Wicks

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The accuracy of the results from a rail vehicle dynamic model is dependent on the realism of the track input to the model. An important part of the track input is the irregularities that exist on actual track. This study analyzes the irregularities inherent in railroad track geometry data, and provides an analytical method for creating track data with the irregularities for use as the input to a dynamic model.

Track data, measured from various classes of track, was examined using statistical and frequency analysis techniques to identify any similarities in the characteristics of the irregularities. The results showed that each class of track had a distinctive value for the standard deviation of the alignment and profile data. It was also determined that the frequency content of all the tracks was contained within a common bandwidth. The track irregularities could then be generated with the same characteristics as an actual track.

The method for creating the track irregularities was then programmed into TRAKVU. TRAKVU is a track preprocessor used in conjunction with NUCARS, a railcar dynamic modeling program\(^1\). TRAKVU enables users to create track data and apply the appropriate irregularities so that the track will have the characteristics of the desired class of track.

A validation was then performed to determine how well track created in TRAKVU simulated actual tracks. The statistical and frequency characteristics of created tracks were compared directly with actual tracks. Created track was also used as the input to a dynamic model. The predicted vehicle response was then compared to the actual vehicle response and the predicted vehicle response using measured track data as the input. The results from the validation showed that the created track performed as well as the measured track in providing the input to the model. Although the predicted response using the created track did not compare as well with the actual vehicle response, this result could be attributed to inaccuracies in the model.

\(^1\) NUCARS and TRAKVU are copyrighted property of the Association of American Railroads.
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