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# Analyzing of Speed Disparity in Mixed Vehicle Technologies on Horizontal Curves

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**Abstract :** Vehicle technologies rapidly evolving due to their multifaceted advantages. Adapted different vehicle technologies like connectivity and automation on the same roads with conventional vehicles controlled by human drivers may increase speed disparity in mixed vehicle technologies. Identifying relationships between speed distribution measures of different vehicles and road geometry can be an indicator of speed disparity in mixed technologies. Previous studies proved that speed disparity measures and traffic accidents are inextricably related. Horizontal curves from three geographic areas were selected based on relevant criteria, and speed data were collected at the midpoint of the preceding tangent and starting, ending, and middle point of the curve. Multiple linear mixed effect models (LME) were developed using the instantaneous speed measures representing the speed of vehicles at different points of horizontal curves to recognize relationships between speed variance (standard deviation) and road geometry. A simulation-based framework (Monte Carlo) was introduced to check the speed disparity on horizontal curves in mixed vehicle technologies when consideration is given to the interactions among connected vehicles (CVs), autonomous vehicles (AVs), and non-connected vehicles (NCVs) on horizontal curves. The Monte Carlo method was used in the simulation to randomly sample values for the various parameters from their respective distributions. Theresults show that NCVs had higher speed variation than CVs and AVs. In addition, AVs and CVs contributed to reduce speed disparity in the mixed vehicle technologies in any penetration rates.

**Keywords :** autonomous vehicles, connected vehicles, non-connected vehicles, speed variance
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