

Data availability statement

The raw data supporting the findings of this study are provided as a supplementary file. The file contains the following columns:

- **Time_s**: Absolute simulation time (seconds).
- **V_theory_kmh, V_measured_kmh, V_physics_kmh, V_fusion_kmh**: Longitudinal velocity (km/h) obtained from the theoretical command, inertial navigation system (measured), physics-based model, and fusion model, respectively.
- **Yaw_theory_radps, Yaw_measured_radps, Yaw_physics_radps, Yaw_fusion_radps**: Yaw rate (rad/s) from the theoretical command, inertial navigation system (measured), physics-based model, and fusion model, respectively.
- **n_motor_theory_rpm, n_motor_measured_rpm, n_motor_physics_rpm, n_motor_fusion_rpm**: Motor rotational speed (rpm) derived from the corresponding longitudinal velocity, transmission ratio, and drive wheel radius.
- **T_motor_theory_Nm, T_motor_measured_Nm, T_motor_physics_Nm, T_motor_fusion_Nm**: Motor torque (Nm) computed from the required tractive force, which is estimated from the vehicle mass, acceleration, and rolling resistance, then divided by the overall transmission ratio and efficiency.

The theoretical values represent the desired motion commands. The measured values are obtained from the inertial navigation system (INS) installed on the vehicle. The physics-based model predictions are generated by a conventional tracked vehicle dynamics model, while the fusion model predictions are produced by the proposed physics-informed machine learning approach described in the manuscript.