T5–theoretical development and numerical validation of an asymmetric linear bilateral control model . using this model all follower vehicles in a platoon can adjust their acceleration and deceleration to closely follow a constant time gap . the asymmetric LBCM can handle any combined powertrain delays and lags up to 0.6 sec . the asymmetric LBCM fails to ensure stable platoon operation over the 0.2 sec lags over the symmetric LBCM, but can handle any combined delays

Bart- Theoretical Development and Numerical Validation of an Asymmetric Linear Bilateral Control Model- Case Study for an Automated Truck Platoon. The novelty of the asymmetric LBCM is that using this model all the follower vehicles in a platoon can adjust their acceleration and deceleration to closely follow a constant desired time gap to improve platoon operational efficiency. We choose automated truck platooning as a case study since heavy-duty trucks experience higher delays and lags in the powertrain system, and limited acceleration andDeceleration capabilities than passenger cars. Our analyses showed that the asymmetry L BCM can handle any combined powertrain delays and. lags up to 0.6 sec while maintaining a constant wanted time gap during a stable platoon operation. While the symmetric L BCCM fails to ensure stable platoon. operation as well as maintain a. constant desired. time gap for any combinedPowertrain delays over 0.2 sec. These findings demonstrate the potential of the. asymmetricl bilateral control model in improving platoon operational. efficiency and stability of an automated truck. platoon.

Gemini- The paper presents a theoretical development and numerical validation of an asymmetric linear bilateral control model (LBCM) for automated vehicle platoons. The asymmetric LBCM uses weighted motion information from leading and following vehicles to determine control inputs, aiming to maintain a constant time gap while enhancing platoon stability. Local and string stability are analyzed theoretically and validated numerically. Simulations using automated truck platoons demonstrate that the asymmetric LBCM outperforms the symmetric LBCM in handling powertrain delays and lags, maintaining a constant time gap and ensuring stable platoon operation with combined delays and lags of up to 0.6 seconds. This model shows promise for improving platoon efficiency and stability in automated truck platoons.

Gpt-4 In the research paper titled "Theoretical Development and Numerical Validation of an Asymmetric Linear Bilateral Control Model- Case Study for an Automated Truck Platoon," the authors introduce and validate an innovative control model designed for automated vehicle platoons, specifically focusing on automated trucks. The model, known as the asymmetric linear bilateral control model (LBCM), uniquely incorporates differing weights on the motion information from both the leading and following vehicles in a platoon to optimize control inputs for each truck. This approach contrasts with traditional symmetric models, allowing for more refined adjustments in acceleration and deceleration to maintain a consistent desired time gap, thereby enhancing platoon efficiency and stability.

The paper thoroughly explores the theoretical underpinnings of the asymmetric LBCM, demonstrating its local and string stability through rigorous analysis. Local stability is confirmed using the criteria for asymptotic stability in linear time-invariant systems, while string stability is established via a method that assesses space gap error attenuation. The practical effectiveness of the asymmetric LBCM is then tested through simulations involving a platoon of fully automated trucks equipped with cooperative adaptive cruise control (CACC), operating under various nonlinear acceleration and deceleration scenarios.

A key aspect of the study is its focus on heavy-duty trucks, which are characterized by significant powertrain delays and limited acceleration/deceleration capabilities compared to passenger vehicles. The asymmetric LBCM's performance is benchmarked against a symmetric version of the model under conditions with varying powertrain delays and lags. The results reveal that the asymmetric LBCM successfully maintains a stable platoon operation and a constant desired time gap with combined powertrain delays and lags of up to 0.6 seconds. In contrast, the symmetric model struggles with delays over 0.2 seconds.

These findings underscore the asymmetric LBCM's superior capability in managing the specific challenges posed by automated truck platoons, suggesting significant potential for enhancing operational efficiency and stability in real-world applications.

Gpt-3 In this paper, an asymmetric linear bilateral control model (LBCM) is developed and validated for automated truck platoons. The model considers motion information from the leading and following vehicles to determine control inputs for the subject vehicle. The asymmetric LBCM allows follower vehicles to adjust acceleration and deceleration to maintain a constant desired time gap, enhancing platoon efficiency and stability. The local and string stability of the model is theoretically analyzed and proven using stability conditions and error attenuation approaches. Simulation results of a cooperative adaptive cruise control (CACC) platoon of automated trucks demonstrate the efficacy of the asymmetric LBCM in handling powertrain delays and lags up to 0.6 sec, outperforming the symmetric LBCM. The study focuses on heavy-duty trucks due to their unique characteristics, such as higher delays and limited acceleration capabilities. By comparing the asymmetric LBCM to the symmetric LBCM, it is shown that the former ensures stable platoon operation and maintains a constant time gap even under challenging conditions. These findings highlight the potential of the asymmetric LBCM in enhancing operational efficiency and stability of automated truck platoons, offering valuable insights for future research and implementation in real-world scenarios.