



Committee on Traffic Flow Theory and Characteristics  
(TRB ACP50)

## ACC Webinar Series



We are proud to announce our 14<sup>th</sup> webinar in the ACC Webinar Series:



### “Oscillation growth in mixed traffic flow of human-driven vehicles and automated vehicles: Experimental study and simulation”

**Dr. Rui Jiang,**  
*Professor, Beijing Jiaotong University*

**Friday, Mar 18th, 2022 --- 10:00 AM (EDT)**

*(3 PM for London; 4 PM for Zurich, Paris, Rome, Amsterdam...; 11 PM for Beijing)*

BlueJeans: <https://bluejeans.com/1280718337>

(NOTE: You do not need to install the BlueJeans app, just click and join with browser.)

#### **ABSTRACT**

This paper reports an experimental study on oscillation growth in the mixed traffic flow of automated vehicles (AVs) and human-driven vehicles (HVs). The leading vehicle moves at constant speed in the experiment. The following vehicles consist of six developable AVs and a different number of HVs. Thus, the market penetration rate (MPR) of AVs decreases with the increase of platoon size. The AVs are homogeneously distributed in the platoon. The constant time gap car-following policy is adopted for the AVs and the gap is set to 1.5 s. The experiment shows that in the 7-vehicle-platoon, the oscillations grow only slightly. In the 10-vehicle-platoon, the AVs could still significantly suppress the growth of oscillations. With the further decrease of MPR of AVs in the 13- and 20-vehicle-platoon, the AVs become having no significant impact on oscillation growth. On the other hand, with the decrease of MPR of AVs, the average density of the vehicles and flow rate of the platoon increase, which demonstrates a trade-off between traffic stability and throughput under the given setup of AVs. The simulation study is also carried out, which exhibits good agreement with the experiment. Finally, sensitivity analysis of the parameters in the AV upper-level control algorithm has been performed, which is expected to guide future experiment design.

#### **BIOGRAPHY**

Rui Jiang is a Professor with the School of Traffic and Transportation, Beijing Jiaotong University, Beijing, China. He received the B.E. and Ph.D. degrees from the University of Science and Technology of China, Hefei, China, in 1998 and 2003, respectively. He was an Alexander von Humboldt Research Fellow from 2005 to 2006 and a Japanese Society for Promotion of Science Research Fellow from 2008 to 2009. He is the author/coauthor of over 200 papers in journals, including Transportation Science, Transportation Research Part B, Part C, IEEE Transactions on Intelligent Transportation Systems, Production and Operations Management, Physical Review E.