Vergleich unterschiedlicher Radverkehrsführungen auf der B7 mittels mikroskopischer Verkehrssimulation

Jonas Löffler

Abstract

The thesis compares different cycling routes on the B7 between Wuppertal central station and the Campus Haspel using microscopic traffic simulation. This study has been caused by the five-year halt in bicycle traffic planning in the area of the B7, even though this lane has been prioritized in the bicycle traffic concept of 2019. The general goal is to demonstrate that a safe cycling route for the section B7 can be developed and carried out alongside the motorized traffic.

In order to answer the research question two scenarios with different cycling routes are developed: a cost-intensive scenario that includes extensive interventions in the road space, and a cost-effective scenario, which manages without major construction interventions and instead relies on the optimization and repurposing of existing space conditions. Both scenarios are then compared in a microscopic simulation to an analysis scenario to test how they affect the traffic-related parameters. The macroscopic traffic model of the city of Wuppertal is used as the database. This data is the basis for the generation of the microscopic analysis network and adapted to the real life conditions by using the control programs of the traffic lights. The control programs of the traffic lights were then optimized for the bicycle traffic variants. Since no traffic flow-fine traffic data from the study area are available for calibration, the traffic volume was derived from the macroscopic model. This methodology is associated with inaccuracies, which limit the expressiveness of the microscopic simulation. However, since the analysis scenario is affected to the same extent as the bicycle traffic scenarios, a trend can still be shown by comparison.

In order to evaluate the scenarios the traffic lights are used based on the quality level of traffic flow from the manual for the dimensioning of road traffic facilities. The results show that the real traffic lights with the derived traffic volume have a poor overall rating. With the help of optimizations of the signal programs of the traffic lights, the traffic lights in the bicycle traffic variants achieve at least the quality level D, which corresponds to the target value of the quality level of traffic flow. The interpretation of the results of the microscopic simulations shows that the cost-intensive bicycle traffic scenario has slightly positive effects on motorized traffic due to the separation of traffic carriers, the use of the entire road space widths, and the optimization of the traffic lights. The cost-effective scenario leads to slight restrictions in traffic flow due to the repurposing of the road space. Bicycle traffic is significantly accelerated and secured in both scenarios by the separation from other traffic carriers.

Supervisors
Univ.-Prof. Dr. Heather Kaths
M.Sc. Aboozar Roosta

Study Programme
M.Sc. Verkehrswirtschaftsingenieurwesen