CALIBRATION AND COMPARISON OF MESOSCOPIC AND MICROSCOPIC TRAFFIC SIMULATION IN URBAN NETWORK

Master‘s Thesis of Adjei Boateng

Mentoring:
M.Sc. Nihan Celikkaya
M.Sc. Sasan Amini

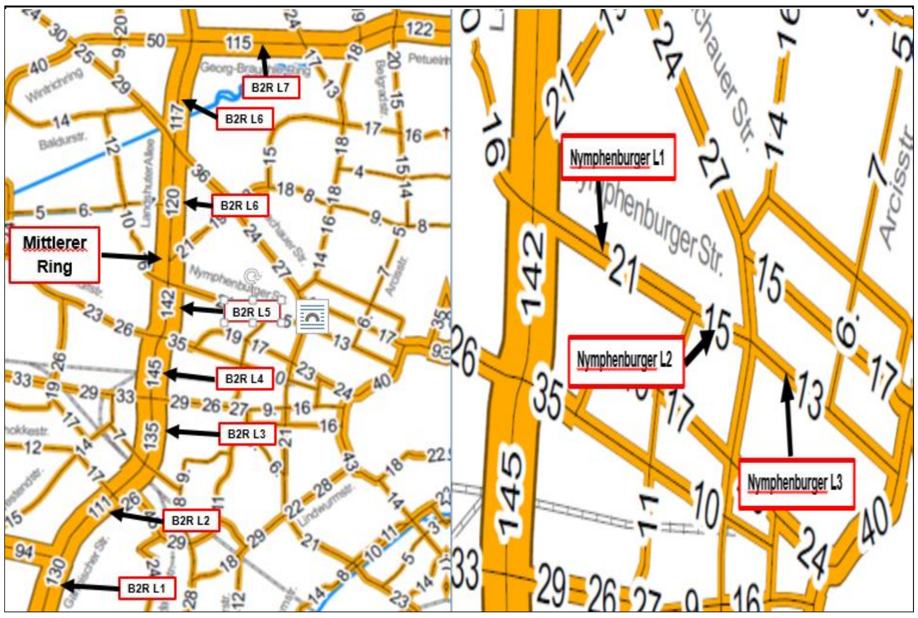

Fig. 1 Traffic Volume Map of Mittlerer Ring and Arterial in Annual Average Daily Traffic (,000)

Assessment of transport systems for effective running of the city is now a must for city managers. Macroscopic, Microscopic or Mesoscopic scales are the assessment levels for transport systems. Microscopic and Macroscopic models are the widely used models for assessing transport systems. These models have their limitations. Microscopic models require high computational and time cost but are great for local and detailed studies. Macroscopic models boast of less computational and time cost but lose comprehensive details of the model.

The objectives of this research were: To build and calibrate an urban network in Vissim 9, calibrate a microscopic and mesoscopic model of Vissim 9 using offline calibration method to achieve the best fit to aggregated measurement and finally, compare and conclude with the obtained results from both models. Figure 1 (on the left) were the two urban road networks selected for this research.

The simulation process started with Model Development, Simulation Parameter, Data Processing, Calibration Limit selection and Selecting Calibration Parameters and Acceptable Range. The simulation period for the model was one hour.

For the Microscopic simulation, only Wiedemann 99 car following model was used to calibrate the Mittlerer Ring and also Wiedemann 74 car following model was used to calibrate the arterial road (urban Motorized). Other models Lane change, lateral and signal control parameters were left in their default values. For the Mesoscopic simulation, Reaction Time and Standstill Distance parameters were used for calibration whiles Maximum Waiting Time was left in its default.

The traffic volume and travel times were used as a measure of the effectiveness (MOE) which is recommended by Washington State Department of Transport. The Mean Root Square Error (MRE) was determined for the MOEs simulation runs. MREs was used for the analysis. Some of the results are shown on the right figure.

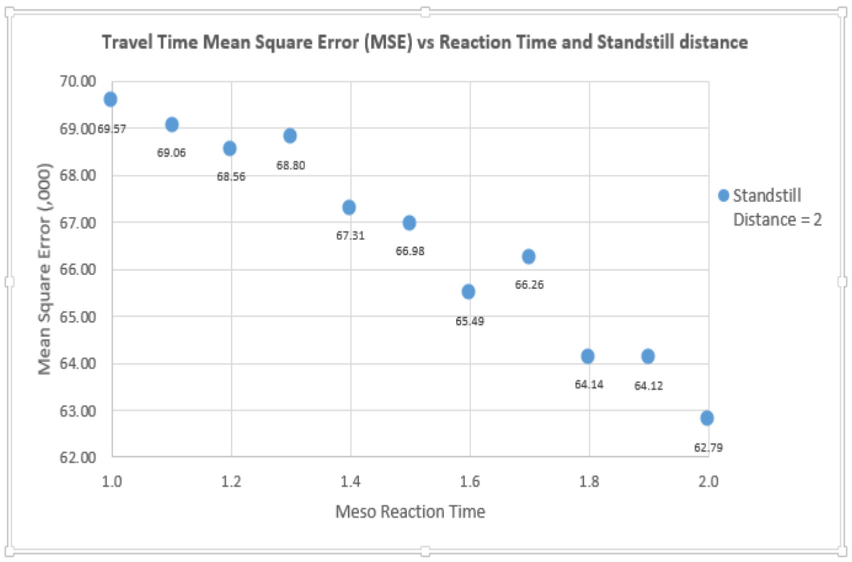

Fig. 4.4 Meso calibration parameter pairs against the travel time MSE (Arterial)

The summary of the conclusion has been tabulated below.

Network	Simulation	Car-Following Model	Volume	Travel Times
Arterial	Microscopic	Wiedemann 74	Sensitive at High ASD	Not Sensitive
	Mesoscopic	Meso	Not Sensitive	Sensitive
Mittlerer Ring	Microscopic	Wiedemann 99	Sensitive to ΔCC0 Sensitive to ΔCC1	Not Sensitive to ΔCC0 Sensitive to ΔCC1
	Mesoscopic	Meso	Sensitive	Sensitive

Tab 5.1 Summary of Conclusions

Microscopic Simulation of Arterial Road: The volume in the network were sensitive to changes in Wiedermann 99 car following model parameters. However, the travel time was not sensitive to the parameter changes.

Mesoscopic Simulation of Arterial Road: The volume in the network and travel times were both sensitive to changes in mesoscopic parameters.

Microscopic Simulation of Mittlerer Ring: The volume in the network were sensitive to changes in Wiedermann 74 car following model parameters. However, the travel time was not sensitive to the parameter changes.

Mesoscopic Simulation of Mittlerer Ring: The volume in the network were not sensitive to changes in mesoscopic parameters. However, the travel time was sensitive to the parameter changes.

A summary of the conclusion is tabulated on the left.