

## SUMMARY OF Ph.D. DISSERTATION

School Integrated Design Engineering	Student Identification Number	<b>SURNAME, First name</b> <b>TAKADA, Yutaka</b>
<b>Title</b> Analysis of local roadsides NOx emissions by on-board exhaust emissions measurement system		
<b>Abstract</b> Reduction of exhaust emissions from vehicles at local roadsides is a pressing issue, since health hazard for people living at local roadsides that may be caused by such emissions is getting serious. This study clarifies factors of local roadsides pollution by conducting an actual condition survey to find out the causes of the intensive NOx pollution and the specific roadsides where the intensive NOx pollution occurs. For this purpose, an on-board emissions measurement system was developed which allows simultaneous measuring of three major factors, which influence on local roadside pollution. Based on the obtained knowledge, this study aims to give suggestions to the road administrators, vehicle manufacturers and drivers on the reduction of NOx emissions at local roadsides. Chapter 1 is an introduction of social background of this study including actual conditions of exhaust gas pollution caused by vehicle traffic and studies conducted in the past . This chapter also describe the study’s execution plan and explains the orientation and purpose of the study. Chapter 2 explains the purpose of development of the on-board emission measurement system, composition of the system, method for emission calculation, examples of application of the system on vehicles, etc. This chapter also compiles the results of verification experiment conducted on chassis dynamometer in order to estimate accuracy of the on-board emission measurement system. Chapter 3 describes results of a running test results conducted on a light-duty truck equipped with an EGR (Exhaust Gas Recirculation) system and a small bus without EGR system. The results show actual NOx pollution from running vehicles at local roadsides. In case of the light-duty truck, intensive NOx emissions occurred mostly at intersections. Acceleration succeeding stops at traffic lights and pause signs on the road and for avoidance of impedimenta was a cause of intensive NOx pollution. In case of the light-duty bus, it is clarified that acceleration while driving slowly on congested arterial roads causes intensive NOx pollution. Chapter 4 analyses NOx pollution at local roadsides from the relationships of NOx emissions factor to vehicle speed conditions and to engine conditions. In case of the light-duty truck, engine operating area with higher NOx emissions was used at vehicle start and/or acceleration. Low EGR rate was a cause of the higher NOx at transient state with high rate of engine speed change. In case of the small bus, low speed start made NOx emissions factor high. Chapter 5 is proposals to major stakeholders for the reduction of NOx pollution at local roadsides. To road administrators: improvement of road infrastructure with fewer factors that make vehicles stop, such as traffic light, pause sign on a road and impedimenta. To vehicle manufacturers: utilization of EGR and effective EGR control during transient state with high rate of engine speed change. To drivers: Mild start and /or acceleration. Chapter 6 summarizes acquired knowledge and concludes the study.		