

Numerical Investigation of the Evaporation and Mixing of UWS in a Diesel Exhaust Pipe

Authors : Tae Hyun Ahn, Gyo Woo Lee, Man Young Kim

Abstract : Because of high thermal efficiency and low CO₂ emission, diesel engines are being used widely in many industrial fields although it makes many PM and NO_x which give both human health and environment a negative effect. NO_x regulations for diesel engines, however, are being strengthened and it is impossible to meet the emission standard without NO_x reduction devices such as SCR (Selective Catalytic Reduction), LNC (Lean NO_x Catalyst), and LNT (Lean NO_x Trap). Among the NO_x reduction devices, urea-SCR system is known as the most stable and efficient method to solve the problem of NO_x emission. But this device has some issues associated with the ammonia slip phenomenon which is occurred by shortage of evaporation and thermolysis time, and that makes it difficult to achieve uniform distribution of the injected urea in front of monolith. Therefore, this study has focused on the mixing enhancement between urea and exhaust gases to enhance the efficiency of the SCR catalyst equipped in catalytic muffler by changing inlet gas temperature and spray conditions to improve the spray uniformity of the urea water solution. Finally, it can be found that various parameters such as inlet gas temperature and injector and injection angles significantly affect the evaporation and mixing of the urea water solution with exhaust gases, and therefore, optimization of these parameters are required.

Keywords : UWS (Urea-Water-Solution), selective catalytic reduction (SCR), evaporation, thermolysis, injection

Conference Title : ICHTA 2014 : International Conference on Heat Transfer and Applications

Conference Location : Osaka, Japan

Conference Dates : October 12-13, 2014