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Report on seminar #2 organization

The report will present both agenda and seminar No. 2 proceedings prepared on the basis of works by researchers involved in the project.

It is focused on dissemination of the project results in the APS Labs at Michigan Technological University

Overview and agenda

The project results and scheduled project activities has been presented to the Advanced Power Systems Laboratories (APS Labs) research staff and PhD students.

The APS Labs is the unit of Michigan Technological University, led by prof. Jeffrey D. Naber, actively involved in the KNOCKY project activities as a partner organization.

The dissemination event was arranged as a presentation on the past and ongoing activities and the research plans for joint MTU-CUT-WUT (Michigan Technological University, Czestochowa University of Technology, Warsaw University of Technology) activities integrated with open discussion to include new ideas in the scheduled future experiments.

In total 54 APS Labs members were invited.

Agenda
The seminar was held on 14th June, 2019
Hall: APS lab, MTU, ME-EM
13:00 – Introduction by Dr. Jeffrey D. Naber
13:10 – Lecture by Dr. Łukasz J. Kapusta
14:10 – Questions and Answers
14:30 – Laboratory visit and discussions at experimental stands
16:00 – Seminar closure

Topics discussed

The presentation given by Dr. Kapusta included comprehensive review of the project achievements made so far, ongoing activities and future plans, which included:

- Direct gas injection in a dual-fuel process. This concept was discussed as the alternative way to avoid knocking combustion by burning low-methane number fuels in a diesel mode. The studies made with Wartsila were shown and discussed.
- The cavitation aspect in the injector nozzles in the case of high-pressure injection of low viscosity fuels (i.e. liquified gases). The simulations results have been shown and the results were discussed.
- The topic of mixing of liquified gases in high-pressure and -temperature environment. The experiments made together with Wartsila were presented.
- The topic of mixing of liquified gases in low-pressure environment and a consequent flash-boiling phenomenon has been discussed.
- The modelling of the flash-boiling sprays done in cooperation with AVL by Mr Rafał Rogóż and Mr Jakub Bachanek has been presented. The model development procedure has been discussed.
- The safety aspects of gas engines in the case of misfiring. The issue of unburnt gas-air mixture flow into the hot exhaust system has been discussed in terms of explosion and detonation threat were presented. The work done by Ms Urszula Niedzielska and Ms Agnieszka Jach have been briefly discussed.
- Optical research capabilities at Warsaw University of Technology have been reviewed in terms of studies on mixing and combustion of gaseous fuels. The work-in-progress studies being performed with Wartsila have been explained to the participants.
- The combustion vessel development for studying large-bore engine injectors using optical techniques has been shown to the audience.
- The spark ignition model development done in cooperation with AVL. The work done by Mr Rafał Pyszczek during his secondment at AVL and after return to WUT has been presented.
- The NOx emissions aspect from large-bore engines has been briefly explained.
- The new fuels testing procedures using rapid compression machine at Wartsila. The studies made by Ms Agnieszka Jach and Mr Michal Klamka have been presented to the participants.
- Knock mitigation methods by water and alcohols injection. The scheduled tests at MTU during secondments of Mr Rafał Rogóż and Dr Łukasz J. Kapusta have been discussed. New ideas have been collected and the updates to the plan have been made.

Conclusions

Summarizing the seminar prof. Stanislaw Szwaja concluded that the project activities performed during the KNOCKY project and the plans for the work at MTU have been developing.
Large audience assured lots of new ideas which resulted in small updates to the research schedule, making it more effective.
Moreover, the participants were introduced into the topics which were carried out with other project participants (Wartsila, AVL) leading to successful dissemination of the project results.