

Modeling and Simulation of a Heat Recovery Cycle for Heavy Duty Trucks

E. Guerrero¹, T. Hehn¹, and C. Kirches¹

Abstract: Next generation vehicles, in particular heavy duty trucks, will increasingly adopt energy conservation concepts in order to comply with tightening emission regulations. In this talk, we consider a previously published dynamic model of a heat recovery cycle for a heavy duty truck. Heat emissions from engine and exhaust gas are used to heat a liquid medium. In steam phase, energy is recovered from this medium using an expander and compressor pair. We present a first principles model obtained from fundamental thermodynamical laws, and discuss requirements towards a formulation of this model that is ready for use with state-of-the-art derivative-based simulation and optimization techniques. We present numerical case studies to verify compliance of our model with real-world data. An outlook on optimization-based control of this heat recovery cycle concludes our talk.

¹ Interdisciplinary Center for Scientific Computing (IWR), Heidelberg University
Im Neuenheimer Feld 368, 69120 Heidelberg, GERMANY
{*enrique.guerrero* | *thomas.hehn* | *christian.kirches*}@iwr.uni-heidelberg.de