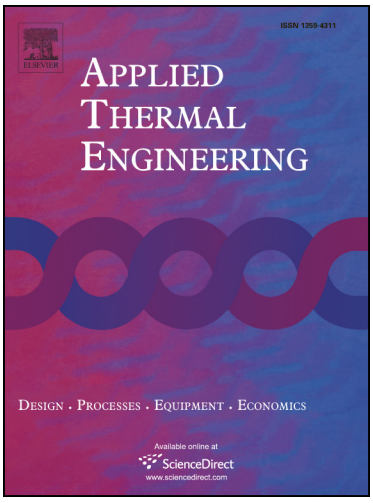

Research Paper

Engine working condition effects on the dynamic response of Organic Rankine Cycle as exhaust waste heat recovery system

Xuan Wang, Gequn Shu, Hua Tian, Peng Liu, Xiaoya Li, Dongzhan Jing

PII: S1359-4311(17)30792-5
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.05.088
Reference: ATE 10400

To appear in: *Applied Thermal Engineering*

Received Date: 5 February 2017
Revised Date: 6 April 2017
Accepted Date: 16 May 2017

Please cite this article as: X. Wang, G. Shu, H. Tian, P. Liu, X. Li, D. Jing, Engine working condition effects on the dynamic response of Organic Rankine Cycle as exhaust waste heat recovery system, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.05.088

Engine working condition effects on the dynamic response of Organic Rankine Cycle as exhaust waste heat recovery system

Xuan Wang, Gequn Shu*, Hua Tian*, Peng Liu, Xiaoya Li, Dongzhan Jing

State key laboratory of engines, Tianjin University, No.92, Weijin Road, Nankai District, Tianjin, 300072, China

Contact Information (E-mail): sgq@tju.edu.cn, thtju@tju.edu.cn

Abstract

Organic Ranking Cycle (ORC) is paid more and more attention on waste heat recovery of internal combustion engines. The ORC system is usually designed under the rated working condition of engines, while the engine often works under different conditions, which means the ORC system always works at part-load conditions and unsteady state as well. Consequently, the research of ORC dynamic response process is very significant and it is useful to develop the control system which ensures the safety and efficiency of the ORC during the whole running process. ORC is nonlinear system and the dynamic response is not the same under different engine working conditions. Therefore, the dynamic math model of an ORC with a medium heat transfer cycle as waste heat recovery system for a natural gas engine of 1000kW rated power is built by Simulink in this work. Since ORC is mainly controlled through working fluid pump speed, the dynamic response process to pump speed change of