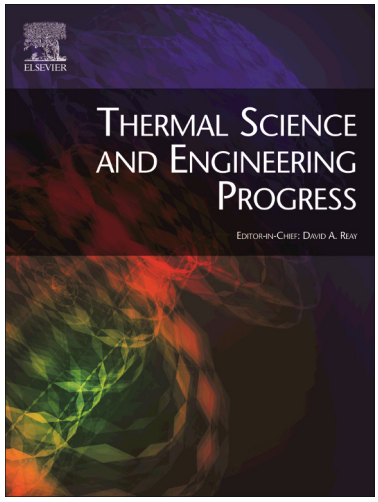


# A Comprehensive Study of Simple and Recuperative Gas Turbine Cycle with Inlet Fogging and Overspray

Mohamed Mostafa, Yehia A. Eldrainy, Mohamed M. EL-Kassaby

PII: S2451-9049(18)30439-6
DOI: https://doi.org/10.1016/j.tsep.2018.09.006
Reference: TSEP 236

To appear in: *Thermal Science and Engineering Progress*

Received Date: 24 June 2018
Accepted Date: 13 September 2018

Please cite this article as: M. Mostafa, Y.A. Eldrainy, M.M. EL-Kassaby, A Comprehensive Study of Simple and Recuperative Gas Turbine Cycle with Inlet Fogging and Overspray, *Thermal Science and Engineering Progress* (2018), doi: https://doi.org/10.1016/j.tsep.2018.09.006

# A Comprehensive Study of Simple and Recuperative Gas Turbine Cycle with Inlet Fogging and Overspray

[*1]Mohamed Mostafa, [1]Yehia A. Eldrainy and [1]Mohamed M. EL-Kassaby
[1]Mechanical Engineering Department, Faculty of Engineering, Alexandria University, Egypt
[*]Corresponding author email: gomohamedm@gmail.com

## ABSTRACT

Ambient temperature has an adverse effect on gas turbine performance. This problem could be overcome through air cooling technologies such as evaporative cooling, fogging, mechanical cooling, absorption chillers, and thermal energy storage. Therefore, this article aims to evaluate the performance of simple and regenerative gas turbine cycles at dry and wet compression cases. A numerical model was constructed for this purpose then the model was validated for dry cycle conditions with an existing turbine SULZER S3 performance data. An inlet fogging was used to full saturate the inlet air and overspray was used for decreasing the compressor inlet temperature at various ambient temperatures. The results showed that the inlet fogging and overspray reduce the compressor work up to 12%. The results also showed that the thermal efficiency was improved with using the inlet fogging and by increasing the overspray rate. The highest thermal efficiency of 44% was achieved when overspray 3% with recuperation was applied. It can be concluded from this work that the specific fuel consumption is reduced significantly and the output power increases, increasing the thermal efficiency when using the recuperator combined with the wet compression and the overspray

## KEY WORDS

Gas turbine, Performance, Fogging, Overspray and Modeling