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# Performance investigation of intercooler operating in wet condition using distributed parameter model

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中文关键词： intercooler wet condition plate-fin heat exchanger condensation film thickness

英文关键词:intercooler wet condition plate-fin heat exchanger condensation film thickness

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| 作者 | 单位 |
|---|---|
| ZHOUYa-feng | School of Energy and Power Engineering, Beijing University of Aeronautics and Astronautics, Beijing 100191, China;Shenyang Engine Design and Research Institute, Aviation Industry Corporation of China, Shenyang 110015, China |
| LIUGui-lin | School of Aeronautic Science and Engineering, Beijing University of Aeronautics and Astronautics, Beijing 100191, China |
| HANYa-hui | Mechanical Engineering Department, Army Aviation Institute, the Chinese People's Liberation Army, Beijing 100123, China |
| YANGChun-xin | School of Aeronautic Science and Engineering, Beijing University of Aeronautics and Astronautics, Beijing 100191, China |
| ZHUZhi-li | School of Energy and Power Engineering, Beijing University of Aeronautics and Astronautics, Beijing 100191, China |




中文摘要:

The performance of a marine gas turbine intercooler operating in wet condition was evaluated. The intercooler was a cross-flow plate-fin heat exchanger that used air and pure water as its working fluids at the hot and cold sides, respectively. The heat transfer performance and the water vapor condensation were investigated for a relative humidity of the inlet air that reached 100% during warship cruise. The condensation of the water vapors increased the hot side outlet temperature by a certain amount, which could in turn influence the performance of the compressor downstream. The condensate film thickness and the void fraction were calculated based on an annular two-phase flow model. It is found that water vapor condensation in hot flow channel increases the outlet temperature with a maximum value of 7.3℃ in the case of 100% relative humidity. The calculated liquid film thickness reaches a maximum value of 4 μm, which indicates negligible thermal resistance to heat transfer. The results of liquid film thicknesses also provide a qualitative prediction of the diameter distribution of the condensate water droplets.

英文摘要:

The performance of a marine gas turbine intercooler operating in wet condition was evaluated. The intercooler was a cross-flow plate-fin heat exchanger that used air and pure water as its working fluids at the hot and cold sides, respectively. The heat transfer performance and the water vapor condensation were investigated for a relative humidity of the inlet air that reached 100% during warship cruise. The condensation of the water vapors increased the hot side outlet temperature by a certain amount, which could in turn influence the performance of the compressor downstream. The condensate film thickness and the void fraction were calculated based on an annular two-phase flow model. It is found that water vapor condensation in hot flow channel increases the outlet temperature with a maximum value of 7.3℃ in the case of 100% relative humidity. The calculated liquid film thickness reaches a maximum value of 4 μm, which indicates negligible thermal resistance to heat transfer. The results of liquid film thicknesses also provide a qualitative prediction of the diameter distribution of the condensate water droplets.

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