MODIFICATION OF THE THERMODYNAMIC CYCLE OF OPEN GAS TURBINE PLANTS

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The purpose of work - improving the thermodynamic cycle of open gas turbine plants (GTP) on purpose to increase their power.

Results of work. The efficiency of the preliminary cooling of air sucked and compressed by compressor of GTP for increase power of plant is showed. The air cooled by utilizing water-ammonia absorption refrigeration plant, which use heat of exhaust gases of turbine. Preliminary cooling of air reduces the work of its compression by compressor, so at the same work of expansion of gases in turbine increases the power of plant.

To confirm the effectiveness of such improvement of thermodynamic cyclt of open GTP corresponding calculations were made at following initial data: initial parameters of working body (air): temperature 30°C, pressure 0.1013 MPa degree of increase of pressure by compressor $\beta = 7$, temperature of gas before turbine 850°C. Analysis of results of calculations showed, that by reducing temperature of air entering the compressor from 30 to 0°C specific work of cycle of GTP increases by 8.8% . At cooling air to minus 30°C work increases by 17.6 %. Thermal coefficient of efficiency of cycle is not changed because remains constant degree of increase of pressure. At studied range of temperatures of air cooling its temperature after compression in the compressor remains sufficient high to ensure combustion of fuel in the combustion chamber.

Ai inclusion in examined cycle regenerative heat exchange between air feed into the combustion chamber and gases worked in the turbine the thermal coefficient of efficiency of cycle substantially increases, because the amount of heat supplied to the working body from external source decrease without changing the specific work of cycle. At investigated temperature range and degree of regeneration by 0,8 thermal coefficient of efficiency increase by 33.8% (from 42.6 to 57.0%). Thus, at preliminary cooling of air, as at conventional GTP, it is necessary to use regenerative heat exchange for increase thermal coefficient of efficiency.

Conclusion . The calculation results confirmed the effectiveness of proposed improvement of thermodynamic cycle of open GTP. Additional expenditures connected with improvement of cycle will be repaid during plant operation owing to increase of its power.