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CONTRIBUTION TO STUDY HEAT TRANSFER IN AN ATMOSPHERIC DIESEL ENGINE WITH VARIABLE COMPRESSION RATIO

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Abstract

The presented work is a contribution to study the phenomena of heat transfer in an atmospheric Diesel engine and it bases essentially on the modeling and the numeral calculation of the factors influential the performances of the engine. Indeed, a thermodynamics approach allowed to model the evolution of the pressure and the temperature of gases contained in the cylinder and the process of combustion in the internal combustion engine by bringing in main influential parameters on the engine such as compression ratio, speed of rotation, cooling of the engine and coefficient of air excess. So a program was established in fortran trying to resume the conditions of the engine of TD43 engine test rig. This allowed to draw the theoretical and real cycles of functioning and to determine consequently, the performances of the studied engine. These results were compared with those determined experimentally.
Besides, the irreversibility of the mixed cycle is presented. A consideration of heat transfer through the walls of the combustion chamber during the contribution of the heat as well as mechanical frictions during the cycle of the internal combustion engine are modeled. A numeric analysis of the efficiency and the power according to the compression ratio for various values of the parameters of heat transfer and mechanical friction reflects the real characteristics of functioning of an internal combustion engine. An optimization of the modeling results, allowed seeing the influence of the combustion stages on the engine performances according to the compression ratio.

Keywords

Internal combustion engine, thermodynamic, heat transfer, friction, performances.