PhD Thesis Abstract

„RESEARCHES ON NAVAL INTERNAL COMBUSTION ENGINES COOLING SYSTEMS OPTIMIZATION”

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In this doctoral thesis the main aim was to optimize the heat transfer processes that govern the entire functioning of the complex energy system called ship.

In this respect, using already established, validated and widely used geometries in naval systems, the main objective of the scientific approach was to identify solutions for improving the performance of cooling systems used on board seagoing ships.

In Chapter 1 "Introduction" I studied the development of naval transport, the evolution of internal combustion engines and the evolution of their geometric and functional parameters.

In Chapter 2, "Energy balance of internal combustion engines", I determined the energy flows of a marine internal combustion engine exemplified by several types of marine internal combustion engines produced by the two major manufacturers MAN B & W and WARTSILA.

In chapter 3 "Current state of cooling systems of internal combustion engines" I presented the constructive variants of the cooling systems for naval internal combustion engines, their geometric and functional parameters and the rules imposed by IACS (International Association of Classification Societies).

In Chapter 4 "Heat Transfer" I studied the theoretical notions regarding the modalities of heat transfer in cooling systems of the internal combustion engines.

Chapter 5 "Physical and chemical properties of fluids and solids" presents the working fluids and solids used in cooling systems of the internal combustion engines, as well as ways of calculating the physico-thermal properties of nanofluids.

In Chapter 6, "Calculation of Plate Heat Exchanger", I have developed a calculation algorithm for the correct sizing and choosing of plate heat exchangers used on board sea and river ships.

In Chapter 7 "Numerical Methods Used for Studying Fluid Flows" are presented the CAD/CAE methods used in modeling of heat exchangers.

Chapter 8 "Modeling of Heat Exchanger Processes for Internal Combustion Engines " presented a series of results obtained by modeling the heat exchangers used to cool the naval internal combustion engines with water working fluid, lubrication oil and a series of nanofluids.

In the conclusion of the PhD thesis, respectively in chapter 9, I presented the conclusions, the personal contributions and the new research openings of the doctoral thesis.