

Mathematical model of liquid vapor compression system for multicircuit cooling systems of high mobile platform

Karelin D., Mulyukin V., Gureev A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Research India Publications. The descriptions of the structure, the principle of operation and the mathematical model of the liquid-vapor compression cooling system, through which an effective cooling of a mobile platform power plant at elevated ambient temperature is possible. The proposed model allows to simulate the thermodynamic processes of heat and mass transfer and heat transfer, depending on the system load, its design parameters and the material of heat exchangers, the mass flow of refrigerant and coolant flow, taking into account the ambient temperature. The result of mathematical modeling showed that by the coolant temperature increase up to 127 °C, an average temperature pressure in a heat exchanger-condenser between the refrigerant and air increased. Therefore the amount of waste heat to the atmosphere was significantly increased. This will ensure an efficient operation of a cooling system at an elevated ambient temperature and will improve the weight and size of a cooling system in general.

Keywords

Boiling, Compressor, Evaporation, Freon, Liquid-vapor cooling system, Mathematical model, Temperature difference