СЕКЦІЯ 5. МОДЕЛЮВАННЯ РОБОЧИХ ПРОЦЕСІВ В ТЕПЛОТЕХНОЛОГІЧНОМУ, ЕНЕРГЕТИЧНОМУ ОБЛАДНАННІ ТА ПРОБЛЕМИ ЕНЕРГОЗБЕРЕЖЕННЯ

MATHEMATICAL STUDY OF HEAT TRANSFER IN DIRECT CONTACT CONDENSER

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The processes of heat and mass transfer in direct contact condensers, where the phases contact surface is formed by polydisperse spray of drops, are rather complicated.

When modeling this processes, it is necessary to take into account many factors, the main of which are the mutual influence of heat exchange and mass transfer, phases interaction surface that is depends on time and condenser height, the patterns of spray surface formation and drops size distribution, the motion of drops in the condensing vapor and the methods for calculating the motion characteristics.

The mathematical model proposed takes into account following equations: balance equations, equations of heat and mass transfer between steam and liquid drops, films and jets, drop motion equation; one-parameter size distribution function of drops. The "Hill's vortex" model for drops was considered. This mathematical model allows to describe satisfyingly the processes in the direct contact condenser for a given steam flow rate and steam parameters, mass flow rate ratio (water steam), the initial temperature of cooling water, and the initial drop distribution function.

It is established that the degree of drop heating and consequently the amount of rejected from the steam heat depends substantially on both the drop size distribution and drop flow direction. It is shown that such factors as cooling water pressure in nozzles, the drop size distribution and the liquid initial temperature have a considerable effect on condensation zone height while mass flow rate ratio and spraying angle affected it much less.