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Experimental Study on Flooding Phenomena in a Three-Phase Direct Contact Heat Exchanger for the Utilisation in Solar Pond Applications

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Abstract : Experiments to study the limitation of flooding inception of three-phase direct contact condenser have been carried out in a counter-current small diameter vertical condenser. The total column height was 70 cm and 4 cm diameter. Only 48 cm has been used as an active three-phase direct contact condenser height. Vapour pentane with three different initial temperatures (40, 43.5 and 47.5 °C) and water with a constant temperature (19 °C) have been used as a dispersed phase and a continuous phase respectively. Five different continuous phase mass flow rate and four different dispersed phase mass flow rate have been tested throughout the experiments. Dimensionless correlation based on the previous common flooding correlation is proposed to calculate the up flow flooding inception of the three-phase direct contact condenser.

Keywords : Three-phase heat exchanger, condenser, solar energy, flooding phenomena
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