ABSTRAK

Pemasangan sirip pada suatu sistem berfungsi untuk memperbesar laju aliran kalor. Di dalam praktek, aliran kalor yang terjadi berlangsung pada keadaan tak tunak. Melihat kenyataan tersebut, penulis mencoba melakukan penelitian pada suatu sirip 1 dimensi keadaan tak tunak. Bentuk sirip yang diteliti adalah kerucut. Penelitian yang dilakukan meliputi distribusi suhu sirip, laju perpindahan kalor, efisiensi, dan efektivitas sirip.

Suhu awal sirip merata di sepanjang posisi sirip. Nilai konduktivitas thermal sirip merupakan fungsi temperatur, yaitu k = k (T). Massa jenis (ρ) dan kalor jenis (c) bahan sirip diasumsikan bernilai tetap selama proses berlangsung, atau tidak berubah terhadap perubahan suhu. Secara tiba-tiba, sirip dikenakan dengan suatu lingkungan fluida baru dimana suhu fluida T_∞ dipertahankan tetap selama proses keadaan tak tunak berlangsung. Fluida tersebut mempunyai nilai koefisien perpindahan kalor konveksi h. sehingga pada permukaan sirip terjadi perpindahan kalor konveksi antara permukaan sirip dengan fluida.

Penelitian dilakukan pada variasi bahan dan variasi nilai koefisien perpindahan kalor konveksi h. Variasi bahan yang dipilih untuk sirip adalah aluminium, baja karbon 0,5%, besi, perak, tembaga. Variasi nilai koefisien perpindahan kalor konveksi h yang diambil adalah 1000 hingga 10000 W/m^2 °C.

Pemecahan masalah di dalam penelitian menggunakan metoda numerik beda hingga cara eksplisit. Metoda ini dilaksanakan dengan menggunakan program Microsoft Excel. Dengan Microsoft Excel, penulis memperoleh berbagai bentuk grafik yang dihasilkan dari nilai data hasil perhitungan dalam program Mcrosoft Excel.

Hasil penelitian meliputi berbagai bentuk pola grafik untuk distribusi suhu sirip, laju perpindahan kalor, efisiensi, dan efektivitas sirip. Dengan meninjau hasil grafik

disimpulkan bahwa semakin tinggi nilai h maka sirip akan semakin cepat mencapai keadaan tunak. Dan bahan yang paling cepat mencapai keadaan tunak adalah perak.

ABSTRACT

The applied fin on a system is used to increase the rate of heat transfer. In fact, heat transfer were in unsteady state. Having known this fact, the writer tried to do a research for a 1 dimensional fin unsteady state. The form of fin which was examined was a cone. This research inclued the examination of temperature distribution, the rate of heat transfer, effeciency, and effectivity.

The initial temperature of fin was equally distributed in all positions of fin. The value of thermal conductivity was a function of temperature, i.e. $k = k\ (T)$. The specific gracity (ρ) and the specific heat (c) of fin were assumed constant during unsteady state process, or it was not change with the change of temperature. Suddenly, this fin was touched with an area of new fluid which the fluid temperature (T_∞) was constant during the unsteady process. This fluid have a value of convection heat transfer coefficient (h). So the wall surfaces of fin occur convection heat transfer between the wall surfaces ang the fluid.

The research were carried out on the variety of substances and the variety value of convection heat transfer (h). The variety of fin substances which were selected for this fin were aluminium, steel of carbon 0,5%, iron, silver, and copper. The variety value of convection heat transfer coefficients which were taken were 1000 until 10000 $W/m^2\,°C$.

To solve the problem in this research used the explicit numerical finite difference method. This method was carried out by using Microsft Excel. By Microsft Excel, the writer obtained many form graphs which was based on by data value from the result calculation in Microsoft Excel.

Result of this research included many form graphs for the temperature ditribution, the rate of heat transfer, effecincy, and effectivity of fin. The writer get a conclusion result, that is a fin will reach steady state quickly, if the calue of convection heat

transfer coefficient (h) is increased. And the substance of fin which reach steady state quickly is silver.