ABSTRAK

Sirip merukan salah satu komponen penting dari bagian sebuah mesin. Sirip menjadi salah satu komponen yang diperhitungkan dalam mendisain atau membentuk suatu blok mesin, karena sirip memiliki peranan penting dalam mendistribusikan suhu panas yang dihasilkan dari kerja mesin menuju keluar (udara bebas). Hal tersebut bertujuan agar mesin tidak *overheat* dan mesin dapat bekerja dengan baik.

Tujuan dari penelitian ini adalah: (a) Membuat program komputasi menggunakan metode beda-hingga *(finite-difference)* cara eksplisit untuk menentukan distribusi suhu, laju aliran kalor, efisiensi, dan efektivitas pada susunan material sirip berbentuk kerucut terpancung kasus satu dimensi pada keadaan tunak. (b) Mengetahui distribusi suhu, laju aliran kalor, efisiensi, dan efektivitas sirip untuk kasus satu dimensi keadaan tunak pada sirip berbentuk kerucut terpancung dengan variasi, kombinasi susunan bahan material, nilai koefisien perpindahan kalor konveksi (h), Sudut kemiringan (α)

Penelitian diselesaikan dengan metode komputasi numerik dengan mempergunakan metode beda-hingga cara eksplisit. Variasi penelitian dilakukan terhadap (a) susunan bahan material sirip, (b) nilai koefisien perpindahan kalor konveksi (h), (c) sudut kemiringan sirip (α). Panjang sirip : L= 0,01 m, panjang material satu : L_1= 0,005 m, panjang material sirip dua : L_2= 0,005 m. Suhu dasar sirip sebesar T_b dengan suhu fluida sebesar T_∞, sifat kedua bahan dianggap homogen, sudut kemiringan sirip sebesar α.

Hasil penelitian terhadap sirip berbentuk kerucut terpancung yang tersusun atas dua material berbeda adalah (a) program komputasi dengan metode beda-hingga cara ekplisit berhasil dibuat dan diterapkan untuk menentukan distribusi suhu, laju aliran kalor, efisiensi, dan efektivitas sirip, (b) distribusi suhu, laju aliran kalor, efisiensi, dan efektivitas sirip untuk kasus satu dimensi keadaan tunak pada sirip berbentuk kerucut terpancung berubah signifikan pada setiap variasi yang digunakan. Namun berbeda pada variasi kemiringan sudut α.

Kata kunci : efektifitas sirip, efisiensi sirip, perpindahan kalor, distribusi suhu, material sirip, tunak.

ABSTRACT

Fin is one of the important components of an engine. Fin becomes one of the components that is calculated in designing or forming an engine block, because fins have an important role in distributing the temperature of heat generated from the engine work going out (free air). It is intended that the engine does not overheat and the machine can work well.

The objectives of this study are: a) Investigating the temperature distribution, heat flow rate, efficiency, and effectiveness in the arrangement of cone-shaped material in a one-dimensional case in steady state. b) Investigating the effect of the value of the convection coefficient h, on the distribution of temperature, heat flow rate, efficiency, and effectiveness on cone-shaped finches in one-dimensional cases at steady state. c) Investigating the effect of the slope of the cruise angle on the distribution of temperature, heat flow rate, efficiency, and effectiveness of the cone-shaped fin in a one-dimensional case at steady state.

Calculation of temperature distribution in this study was carried out using computational methods, where the temperature distribution is influenced by two processes, namely, the transfer of conduction heat and the convection heat transfer, the thermal conductivity of the material k, the convection heat transfer coefficient h, the cross-sectional area which experiences heat transfer Ai. The fluid temperature is assumed to be 30 ° C and the initial temperature at each volume T0 = 100 ° C and the fin temperature, Tb = 100 ° C at steady state. The variations of this study are the arrangement of fin material, the value of the convection heat transfer coefficient (h), and the slope of the fin angle.

The results of the study of deciduous conical fins composed of two different materials are a) computational programs with different methods - to the explicit method successfully created and applied to determine the temperature distribution, heat flow rate, efficiency, and effectiveness of fins. b) in steady state, the greater the amount of thermal conductivity of the material ($k_1 + k_2$), the greater the heat flow rate, efficiency, and effectiveness. c) the greater the convection transfer coefficient (h) given to the fins, the greater the flow rate of the heat, but the efficiency and effectiveness will be even smaller. c)

Keywords: fin effectiveness, fin efficiency, heat transfer, temperature distribution, fin material, steady.