INTISARI

Tulisan ini memaparkan tentang perhitungan distribusi suhu dan laju perpindahan kalor yang terjadi pada benda padat tiga dimensi pada keadaan tak tunak dengan konduktivitas termal bahan berubah terhadap perubahan suhu, atau k=k(T), benda berbangkit nnergi secara merata.

Benda uji berbentuk kubus dengan ukuran LxLxL. Suhu awal benda merata, sebesar Ti. Secara tiba tiba dikondisikan pada lingkungan fluida yang mempunyai suhu T_∞ dan nilai koefisien perpindahan kalor konveksi h, yang keduanya diasumsikan tetap dan merata dari waktu ke waktu. Persoalannya adalah bagaimana pola distribusi suhu yang terjadi di dalam benda dan berapa besar laju perpindahan kalor yang dilepaskan dari waktu ke waktu. Massa jenis ρ dan kalor jenis benda c diasumsikan tetap. Selama proses, benda tidak mengalami perubahan bentuk dan volume. Di dalam benda terdapat pembangkitan energi sebesar $\dot{q}$. Penyelesaian persoalan dilakukan secara simulasi numerik dengan mempergunakan metode beda-hingga cara eksplisit.

Semakin besar nilai h, pola distribusi suhu yang terjadi dari waktu ke waktu semakin tidak merata. Semakin besar $\dot{q}$, laju perpindahan kalor yang dilepas semakin besar.

ABSTRACT

This article concerned to the calculation of temperature distribution and acceleration transfer of heat that happened at solid three dimension rigid body in unsteady state situation with material thermal conductivity is changed according to the change of temperature, or "k=k(T)" flattened generate energy object.

The test objects were in form of cubics with the size LxLxL. Temperature early object flatten, equal to "Ti". Those objects were abruptly conditioned to fluid environment in the temperature of "T_∞" and coefficient value transfer of convection heat "h", both of them were assumed remain to and flatten from time to time. The problem was how the temperature distribution pattern that happened in each object, and how fast the accelerating transfer of discharged heat from time to time. Specific mass and specific calor type of "c" were assumed as remain. During the process, the object did not experience volume and shape changing. There was evocation of energi that equal to $\dot{q}$ in each object.

The solutions of problem were done by numerical simulation utilize through the explicit finite different method. The greater value of "h", the more unflatten pattern of the temperature distribution that happened from time to time. The greater value of " $\dot{q}$ ", the more acceleration of heat released transfer.