THE CONVECTIVE THERMAL TRANSFER ANALYSIS AT THE FLAT THERMAL MICRO-PIPES THROUGH CRANK-NICOLSON METHOD

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Abstract: *Flat thermal micro-pipes, unlike thermal pipes, have restricted areas of utilization, those being utilized at those systems which ensure the quick cooling of the components at which it is necessary to dissipate the heat when the specific flux exceeds a couple of hundreds of W/m^2. In this article it is wanted to analyze how does the heat transfer go which is realized through flat thermal micro-pipes through Crank-Nicolson method when an end of the pipe is heated and the other one is washed with a jet of cold air. The finite element method will reduce the problem of the transitory heat transfer at a set of first order differential equations. These equations describe the process of heat transfer as being linear in limit conditions whereby the physical and thermal proprieties are invariable during the time. In this way, it will be developed the differential equations which describe the heat transport phenomenon, the mass transfer phenomenon ant the moment of the thermal transfer. After the establishing of the initial parameters and the frontier ones, it will be developed an application in Matlab which will highlight the thermal transfer on the whole length of the flat thermal micro-pipe.*

Keywords: *Crank-Nicolson method, thermal transfer*

1. Introduction

In the analysis through the finite element realized in Matlab, the method of discretization is based on the idea of the field calculation as being formed from a collection of finite volumes. Every finite volume is represented by a line in 1D or by an area in 2D. In the Cartesian rectangular coordinates in 2D the simplest finite volumes are the rectangles. For every nod, the faces of the rectangles are formed by a perpendicular drawing through the middle of two adjacent nodes. The discretization equations are obtained through the integration of the equations with partial derived, initially during the period of every finite volume. The method could also extend to the nonlinear methods, according to [1].

The liquid heated initially by the heat source will be brought in the flat thermal micro pipe in the state of vapors through a process isobaric- isothermal. After they are made, the vapors will have an ascending movement, a horizontal one and will pass through an adiabatic transformation in the central area of the flat thermal micro pipe.

The vapors will go to the opposite end of the heat where they will suffer a condensation isobaric- isothermal process, resulting condenses. This, through the capillarity phenomenon will head again, in liquid state, to the vaporization area. In