length of the periodic suction velocity. The negative sign in (2.1) indicates that the suction is towards the plate. We choose a co-ordinate system with plate lying vertically $\bar{x}-\bar{z}$ plane such that $\bar{x}$ axis is taken along the plate in the direction of the free stream flow U and $\bar{y}$ axis is perpendicular to the plane of the plate. A uniform magnetic field is applied along $\bar{x}$ axis. Since the plate is infinite is $\bar{x}$ direction, all physical quantities will be independent of $\bar{x}$.

The boundary conditions of the problem are

$\bar{u}=0;\ \bar{v}=-v_0(1+\varepsilon\cos\frac{\pi\bar{z}}{L}),\ \bar{w}=0, \bar{T}=\bar{T}_w$

at $\bar{y}=0$

$\bar{u}=U;\ \bar{v}=-v_0,\ \bar{w}=0,\ \bar{p}=\bar{p}_\infty\ \ \bar{T}=\bar{T}_\infty$ at

$\bar{y}\to\infty$ (2.2)

The subscripts w and ∞ denote physical quantities at the plate and in the free stream respectively.

We introduce the following non-dimensional parameters

$$y=\frac{\bar{y}}{L},\ z=\frac{\bar{z}}{L},\ u=\frac{\bar{u}}{L},\ v=\frac{\bar{v}}{L},\ w=\frac{\bar{w}}{L},\ p=\frac{\bar{p}}{\rho U^2},$$

$$\bar{T}=\frac{\bar{T}-\bar{T}}{\bar{T}w-\bar{T}_\infty} \qquad (2.3)$$

where $\bar{u}\bar{v}, \bar{w}$ be the velocity components in the direction of $\bar{x},\bar{y},\bar{z}$ respectively, $\bar{T}$ the temperature, ρ the density, g the acceleration due to gravity, β the coefficient of volume expansion, ν the kinematic viscosity, $\bar{T}_\infty$ the temperature of the fluid in the free stream, $\bar{p}$ the pressure, σ the electrical conductivity, B_o the magnetic induction, C_p the specific heat of the fluid at constant pressure, k the thermal conductivity of the fluid and all other symbols have their usual meanings.

Introducing the non - dimensional parameters (2.3) in the governing equations for velocity and temperature, we obtain the equation of continuity:

$$\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}=0 \qquad (2.4)$$

momentum equations

$$v\frac{\partial u}{\partial y}+w\frac{\partial u}{\partial z}=RGT+\frac{1}{R}\left(\frac{\partial^2 u}{\partial y^2}+w\frac{\partial^2 u}{\partial z^2}\right)-k_2\left\{\frac{1}{2}v\frac{\partial}{\partial y}\left(\frac{\partial^2 u}{\partial y^2}+w\frac{\partial^2 u}{\partial z^2}\right)+\frac{1}{2}w\frac{\partial}{\partial y}\left(\frac{\partial^2 u}{\partial y^2}+w\frac{\partial^2 u}{\partial z^2}\right)-\frac{1}{2}\frac{\partial u}{\partial y}\left(\frac{\partial^2 v}{\partial y^2}+w\frac{\partial^2 v}{\partial z^2}\right)-\frac{1}{2}\frac{\partial u}{\partial z}\left(\frac{\partial^2 w}{\partial y^2}+w\frac{\partial^2 w}{\partial z^2}\right)-\frac{\partial u}{\partial y}\frac{\partial^2 u}{\partial y^2}\right.$$

$$\left.\frac{\partial w}{\partial y}\frac{\partial^2 u}{\partial y\partial z}-\frac{\partial v}{\partial z}\frac{\partial^2 u}{\partial y\partial z}-\frac{\partial w}{\partial z}\frac{\partial^2 u}{\partial y^2}\right\} \qquad (2.5)$$

$$v\frac{\partial u}{\partial y}+w\frac{\partial u}{\partial z}=-\frac{\partial p}{\partial y}+\frac{1}{R}\left(\frac{\partial^2 v}{\partial y^2}+\frac{\partial^2 v}{\partial z^2}\right)-k_2\left\{\frac{1}{2}v\frac{\partial^3 v}{\partial y^3}+\frac{1}{2}v\frac{\partial^3 v}{\partial y\partial z^2}+\frac{1}{2}w\frac{\partial^3 v}{\partial z^3}+\frac{1}{2}w\frac{\partial^3 v}{\partial y^2\partial z}-\frac{3}{2}\frac{\partial v}{\partial y}\frac{\partial^2 v}{\partial y^2}-\frac{1}{2}\frac{\partial v}{\partial z}\frac{\partial^2 v}{\partial y\partial z}-\frac{1}{2}\frac{\partial v}{\partial z}\frac{\partial^2 w}{\partial y^2}-\frac{1}{2}\frac{\partial w}{\partial z}\frac{\partial^2 v}{\partial y^2}-\frac{\partial w}{\partial z}\frac{\partial^2 v}{\partial y\partial z}\right\}-\frac{M^2}{R}v \qquad (2.6)$$