υ : Kinematic viscosity(m^2/s)

ρ :Fluid density(kg/m^3)

θ : Non-dimensional temperature

θ_r :Variable viscosity(Ns/m^2)

μ : Fluid viscosity(Pa.s)

σ : Electrical conductivity of the fluid($s.m^{-1}$)

APPENDIX

$$A_1=\frac{Sc+\sqrt{Sc^2+4\gamma Sc}}{2},\ A_2=\frac{\Pr+\sqrt{\Pr^2+4R\Pr}}{2},$$

$$A_3=\frac{-\Pr Q_1}{A_1^2-A_1\Pr-R\Pr},\ A_4=(A_3-1)A_2-A_3A_1,$$

$$A_5=1-\frac{A_4}{1-\theta_r},\qquad N=M+\frac{1}{K},$$

$$A_6=\frac{A_5+\sqrt{A_5^2+4N}}{2},\ A_7=\frac{Sc+\sqrt{Sc^2+4Sc(\gamma+n)}}{2},$$

$$A_8=\frac{\Pr+\sqrt{\Pr^2+4\Pr(R+n)}}{2},\ A_9=\frac{A_5+\sqrt{A_5^2+4(N+n)}}{2}$$

$$A_{10}=-\frac{Gm+Gr+N}{N(1+hA_6)},$$

$$A_{11}=AA_{10}A_6-\frac{A_{10}A_6}{1-\theta_r}[A_{17}+A_5-1]-Gr-Gm+N-n$$

$$A_{12}=\frac{AScA_1}{A_1^2-ScA_1-Sc(\gamma+n)},\ A_{13}=\frac{\Pr(A_1AA_3-A_{12}Q_1)}{A_1^2+\Pr A_1-\Pr(R+n)},$$

$$A_{14}=\frac{\Pr AA_2(1-A_3)}{A_2^2-\Pr A_2-\Pr(R+n)},\ A_{15}=\frac{\Pr Q_1(A_{12}-1)}{A_7^2-\Pr A_7-\Pr(R+n)},$$

$$A_{16}=1-A_{13}-A_{14}-A_{15},$$

$$A_{17}=-(A_{16}A_8+A_{15}A_7+A_{14}A_2+A_{13}A_1).$$