CHAPTER 5

CONCLUSION

In this study, approach solutions and correction factor have been presented. Exact solution and one term approximation solution have been compared. Errors have been shown between exact solution and one term approximation solution. These errors can be seen from figures for each geometry, the error of one term approximation solution in dimensionless temperature is less than 1% for $\tau > 0.2$.

A correction factor has been investigated between exact solution and one term approximation solution. It has been defined as

$$\theta_{exact} = C_f * \theta_{one\ term}$$

Correction factor (C_f) is a function of dimensionless time and dimensionless position and Biot number. For different Biot numbers different correction factors have been determined as fourth degree polynomial function as follows;

$$C_f = a + b * \bar{x} + c * \bar{x}^2 + d * \bar{x}^3 + e * \bar{x}^4$$

where the coefficients are function of dimensionless time. But unique correction factor as a function of Biot Number, dimensionless time and dimensionless position couldn't be obtained.

It has been considered to take first two terms to minimize error of one term approximation solution. Only two terms have been taken and dimensionless temperature have been calculated. It is very convenient to express the solution using this two term approximation. The values of the two term approximation solution are close to the values of the exact solution. This can be seen from Figure 4.19, Figure 4.20 and Figure 4.21. As a result of this study it can be concluded that the two term approximation solution can be used for $\tau > 0.04$ with error under 1%.