This paper deals with a numerical investigation of natural convection of heat transfer in a horizontal eccentric annulus between a square outer enclosure and a heated circular inner cylinder.

The governing equations are expressed by the term of the stream function-vorticity with dimensionless temperature. The body fitted coordinate system (BFC) was used to stretch over the physical domain of the presented problem. The Poission's equation of stream function is solved by successive over relaxation (SOR) method, while time marching technique was the best choice to solve both vorticity and energy equation.

The results are presented for the streamlines and isotherms as well as the average Nusselt number at different eccentricities and angular positions. Comparison with previous theoretical results shows good agreement.