Number of Iteration VS Over Relaxation Factor Plot

Number of Iterations vs **Over Relaxation Factor**

- 9888
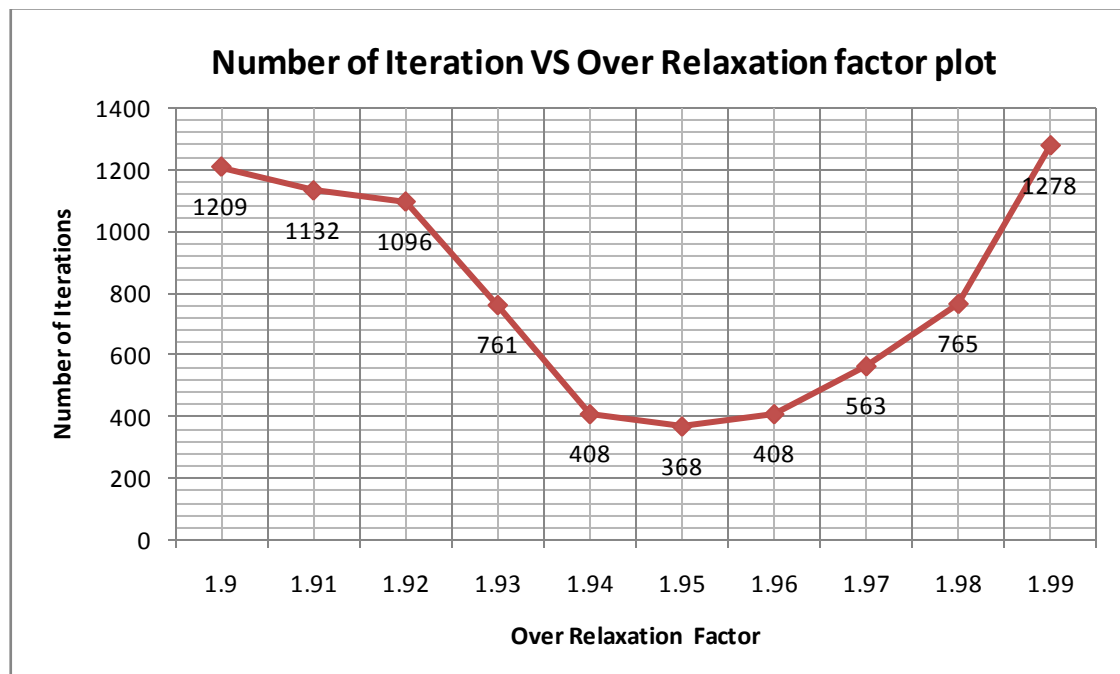- 8229
- 6748
- 5844
- 4411
- 3495
- 2718
- 1956
- 1205

From the graph we can infer that number of iterations drastically reduced from 9888 to 1205 when over relaxation factor is reduced from 1.1 to 1.9 in the step of 0.1. Next we investigate the above variation in the zoom out domain of 1.9 to 2 by increasing the over relaxation factor in a step of 0.01.

Number of Iteration VS Over Relaxation factor plot

Number of Iterations vs **Over Relaxation Factor**

- 1209
- 1132
- 1096
- 761
- 408
- 368
- 408
- 563
- 765
- 1278

We can see from the above graph that Number of iterations reduces to a minimum and then again increases. The over relaxation factor value at which we obtain least number of iteration is 1.95. So the value of ω optimum is:

$$\omega_{opt} = 1.95$$

Table 1: Comparison of Solution of Algebraic Equation Method with the initial guess of temperature field taken as 0°C

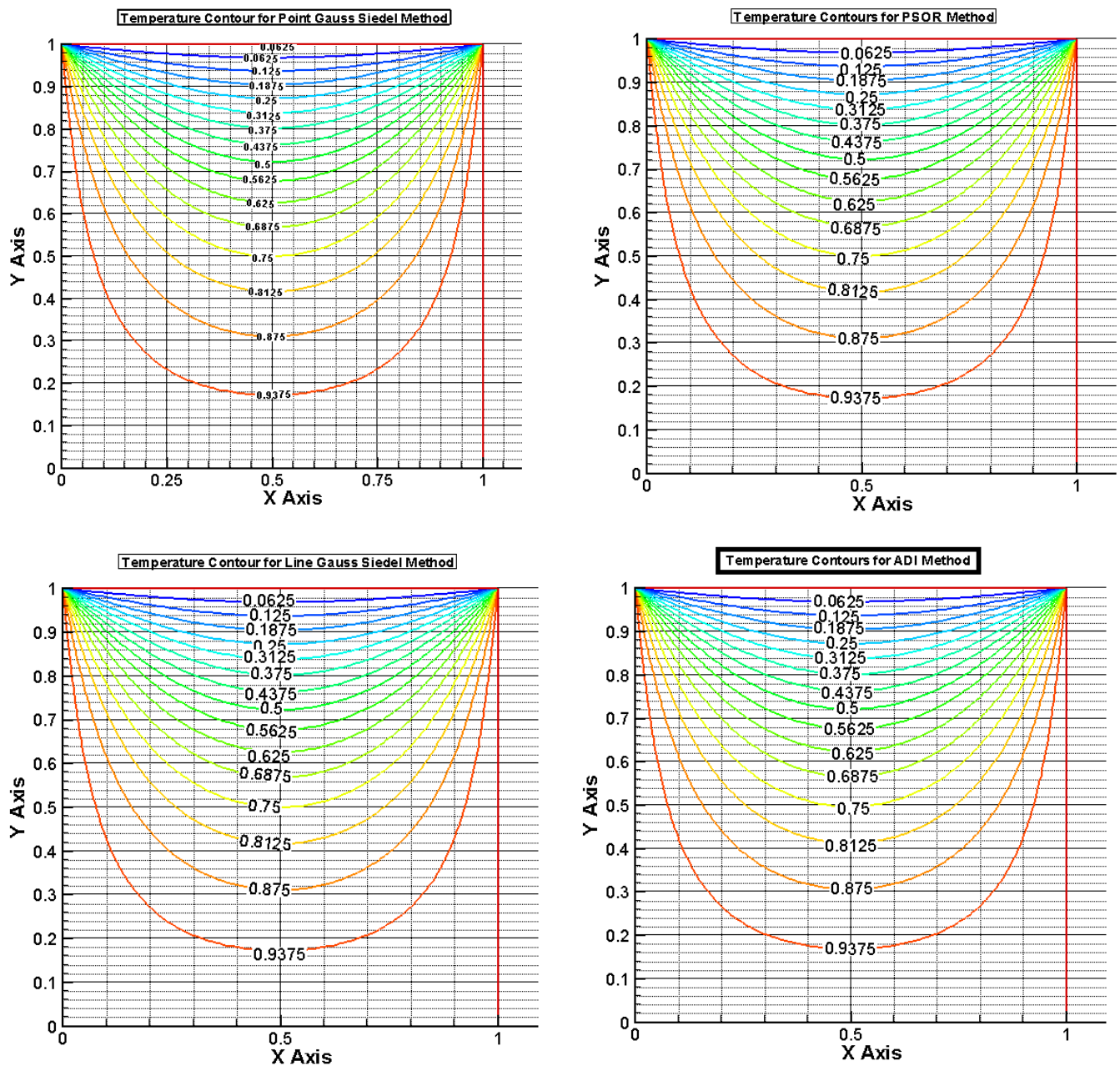| METHOD	NUMBER OF ITERATION TILL CONVERGENCE	EXECUTION TIME REQUIRED TILL CONVERGENCE
Point Gauss Siedel	11285	14
Line Gauss Siedel (TDMA)	5901	9
PSOR at ω_{opt} = 1.95	376	1
ADI	3050	7

Figure 1: Temperature Contours obtained for Different Solution Methods