# Numerical Results of the Experiments in the Paper titled: New inertial-based spectral projection method for solving system of nonlinear equations with convex constraints

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In the tables below, (i) number of iterations is denoted by #iter, (ii) number of function evaluations is represented by #fval, and (iii) the norm of the objective function $\|\Omega(\widehat{z})\|$ is denoted by Norm. Also, DIM denotes dimensions and IP represents initial points.

Finally, NISPM stands for the method "New inertial-based spectral projection method for solving system of nonlinear equations with convex constraints", DAIS1 represents the method "A Modified Spectral Gradient Projection Method for Solving Non-linear Monotone Equations with Convex Constraints and Its Application", and DAIS1 denotes the method "Inertial-Based Derivative-Free Method for System of Monotone Nonlinear Equations and Application".

Table 1: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 1

| Problem 1 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 3 | 10 | 0 | 4 | 15 | 1.49E-07 | 3 | 8 | 2.16E-07 |
| | 2 | 2 | 7 | 9.93E-16 | 10 | 31 | 8.05E-08 | 8 | 17 | 2.22E-09 |
| | 3 | 3 | 10 | 0 | 7 | 24 | 2.97E-08 | 6 | 14 | 2.38E-09 |
| | 4 | 3 | 10 | 0 | 9 | 30 | 7.33E-08 | 6 | 14 | 3.04E-07 |
| | 5 | 1 | 4 | 0 | 6 | 21 | 3.85E-07 | 6 | 14 | 2.48E-09 |
| | 6 | 1 | 4 | 0 | 6 | 21 | 3.6E-07 | 6 | 14 | 2.47E-09 |
| | 7 | 1 | 4 | 0 | 6 | 21 | 3.85E-07 | 6 | 14 | 2.48E-09 |
| | 8 | 1 | 4 | 0 | 6 | 21 | 3.61E-07 | 6 | 14 | 2.52E-09 |
| | 9 | 1 | 4 | 0 | 6 | 21 | 5.34E-07 | 5 | 12 | 7.71E-07 |
| | 10 | 1 | 4 | 0 | 6 | 21 | 2.32E-07 | 5 | 12 | 1.49E-07 |
| | 11 | 1 | 4 | 0 | 5 | 18 | 3.49E-08 | 4 | 10 | 8.93E-09 |
| | 12 | 2 | 7 | 0 | 10 | 33 | 1.98E-08 | 10 | 22 | 1.09E-08 |
| | 13 | 2 | 7 | 0 | 6 | 21 | 2.16E-08 | 7 | 16 | 5.06E-09 |
| 30000 | 1 | 3 | 10 | 0 | 4 | 15 | 2.64E-07 | 3 | 8 | 4.68E-07 |
| | 2 | 2 | 7 | 9.93E-16 | 10 | 31 | 8.05E-08 | 8 | 17 | 2.22E-09 |
| | 3 | 3 | 10 | 0 | 7 | 24 | 5.2E-08 | 6 | 14 | 5.14E-09 |
| | 4 | 3 | 10 | 0 | 9 | 30 | 7.34E-08 | 6 | 14 | 3.07E-07 |
| | 5 | 1 | 4 | 0 | 6 | 21 | 6.38E-07 | 6 | 14 | 5.94E-09 |
| | 6 | 1 | 4 | 0 | 6 | 21 | 6.25E-07 | 6 | 14 | 5.94E-09 |
| | 7 | 1 | 4 | 0 | 6 | 21 | 6.38E-07 | 6 | 14 | 5.94E-09 |
| | 8 | 1 | 4 | 0 | 6 | 21 | 6.25E-07 | 6 | 14 | 5.96E-09 |
| | 9 | 1 | 4 | 0 | 6 | 21 | 6.2E-07 | 6 | 14 | 3.57E-09 |
| | 10 | 1 | 4 | 0 | 6 | 21 | 4.02E-07 | 5 | 12 | 3.22E-07 |
| | 11 | 1 | 4 | 0 | 5 | 18 | 6.49E-08 | 4 | 10 | 1.36E-08 |
| | 12 | 2 | 7 | 0 | 10 | 33 | 4.45E-08 | 10 | 22 | 1.15E-07 |
| | 13 | 2 | 7 | 0 | 6 | 21 | 3.66E-08 | 7 | 16 | 1.02E-08 |
| 50000 | 1 | 3 | 10 | 0 | 4 | 15 | 3.42E-07 | 3 | 8 | 6.6E-07 |
| | 2 | 2 | 7 | 9.93E-16 | 10 | 31 | 8.05E-08 | 8 | 17 | 2.22E-09 |
| | 3 | 3 | 10 | 0 | 7 | 24 | 6.72E-08 | 6 | 14 | 7.23E-09 |
| | 4 | 3 | 10 | 0 | 9 | 30 | 7.34E-08 | 6 | 14 | 3.08E-07 |
| | 5 | 1 | 4 | 0 | 6 | 21 | 8.17E-07 | 6 | 14 | 8.42E-09 |
| | 6 | 1 | 4 | 0 | 6 | 21 | 8.07E-07 | 6 | 14 | 8.42E-09 |
| | 7 | 1 | 4 | 0 | 6 | 21 | 8.17E-07 | 6 | 14 | 8.42E-09 |
| | 8 | 1 | 4 | 0 | 6 | 21 | 8.07E-07 | 6 | 14 | 8.44E-09 |
| | 9 | 1 | 4 | 0 | 6 | 21 | 7.31E-07 | 6 | 14 | 6.76E-09 |
| | 10 | 1 | 4 | 0 | 6 | 21 | 5.19E-07 | 5 | 12 | 4.53E-07 |
| | 11 | 1 | 4 | 0 | 5 | 18 | 8.5E-08 | 4 | 10 | 1.83E-08 |
| | 12 | 2 | 7 | 0 | 10 | 33 | 6E-08 | 10 | 22 | 1.7E-07 |
| | 13 | 2 | 7 | 0 | 6 | 21 | 4.7E-08 | 7 | 16 | 1.42E-08 |
| 80000 | 1 | 3 | 10 | 0 | 4 | 15 | 4.33E-07 | 4 | 10 | 7.38E-10 |
| | 2 | 2 | 7 | 9.93E-16 | 10 | 31 | 8.05E-08 | 8 | 17 | 2.22E-09 |
| | 3 | 3 | 10 | 0 | 7 | 24 | 8.51E-08 | 6 | 14 | 1.61E-08 |
| | 4 | 3 | 10 | 0 | 9 | 30 | 7.34E-08 | 6 | 14 | 3.08E-07 |
| | 5 | 1 | 4 | 0 | 7 | 24 | 5.12E-09 | 6 | 14 | 1.89E-08 |
| | 6 | 1 | 4 | 0 | 7 | 24 | 5.08E-09 | 6 | 14 | 1.89E-08 |
| | 7 | 1 | 4 | 0 | 7 | 24 | 5.12E-09 | 6 | 14 | 1.89E-08 |
| | 8 | 1 | 4 | 0 | 7 | 24 | 5.08E-09 | 6 | 14 | 1.89E-08 |
| | 9 | 1 | 4 | 0 | 6 | 21 | 9.31E-07 | 6 | 14 | 1.81E-08 |
| | 10 | 1 | 4 | 0 | 6 | 21 | 6.56E-07 | 6 | 14 | 5.05E-10 |
| | 11 | 1 | 4 | 0 | 5 | 18 | 1.08E-07 | 4 | 10 | 3.92E-08 |
| | 12 | 2 | 7 | 0 | 10 | 33 | 7.71E-08 | 10 | 22 | 3.85E-07 |
| | 13 | 2 | 7 | 0 | 6 | 21 | 5.93E-08 | 7 | 16 | 3.1E-08 |
| 100000 | 1 | 3 | 10 | 0 | 4 | 15 | 4.85E-07 | 4 | 10 | 1.04E-09 |
| | 2 | 2 | 7 | 9.93E-16 | 10 | 31 | 8.05E-08 | 8 | 17 | 2.22E-09 |
| | 3 | 3 | 10 | 0 | 7 | 24 | 9.52E-08 | 6 | 14 | 2.28E-08 |
| | 4 | 3 | 10 | 0 | 9 | 30 | 7.34E-08 | 6 | 14 | 3.08E-07 |
| | 5 | 1 | 4 | 0 | 7 | 24 | 5.71E-09 | 6 | 14 | 2.67E-08 |
| | 6 | 1 | 4 | 0 | 7 | 24 | 5.68E-09 | 6 | 14 | 2.67E-08 |
| | 7 | 1 | 4 | 0 | 7 | 24 | 5.71E-09 | 6 | 14 | 2.67E-08 |
| | 8 | 1 | 4 | 0 | 7 | 24 | 5.68E-09 | 6 | 14 | 2.67E-08 |
| | 9 | 1 | 4 | 0 | 7 | 24 | 5.38E-09 | 6 | 14 | 2.9E-08 |
| | 10 | 1 | 4 | 0 | 6 | 21 | 7.34E-07 | 6 | 14 | 7.14E-10 |
| | 11 | 1 | 4 | 0 | 5 | 18 | 1.21E-07 | 4 | 10 | 5.52E-08 |
| | 12 | 2 | 7 | 0 | 10 | 33 | 8.65E-08 | 10 | 22 | 5.45E-07 |
| | 13 | 2 | 7 | 0 | 6 | 21 | 6.62E-08 | 7 | 16 | 4.37E-08 |

Table 2: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 2

| Problem 2 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **DIM** | **IP** | **#iter** | **#fval** | **Norm** | **#iter** | **#fval** | **Norm** | **#iter** | **#fval** | **Norm** |
| 10000 | 1 | 6 | 20 | 3.8E-11 | 4 | 15 | 3.73E-07 | 3 | 8 | 5.28E-07 |
| | 2 | 4 | 14 | 3.43E-07 | 7 | 24 | 2.75E-08 | 4 | 10 | 4.43E-08 |
| | 3 | 6 | 20 | 1.08E-07 | 6 | 21 | 2.31E-08 | 5 | 12 | 9.41E-07 |
| | 4 | 8 | 26 | 1.27E-10 | 8 | 27 | 2.02E-08 | 4 | 10 | 2.99E-08 |
| | 5 | 7 | 23 | 4.29E-08 | 8 | 27 | 7.98E-07 | 6 | 14 | 5.37E-09 |
| | 6 | 7 | 23 | 4.29E-08 | 8 | 27 | 7.98E-07 | 6 | 14 | 5.37E-09 |
| | 7 | 7 | 23 | 4.29E-08 | 8 | 27 | 7.98E-07 | 6 | 14 | 5.37E-09 |
| | 8 | 7 | 23 | 4.31E-08 | 8 | 27 | 7.99E-07 | 6 | 14 | 5.42E-09 |
| | 9 | 7 | 23 | 3.36E-08 | 8 | 27 | 7.88E-07 | 6 | 14 | 5.26E-09 |
| | 10 | 6 | 20 | 2.79E-08 | 7 | 24 | 7.73E-08 | 5 | 12 | 1.04E-09 |
| | 11 | 6 | 20 | 1.34E-08 | 6 | 21 | 2.59E-08 | 4 | 10 | 6.05E-07 |
| | 12 | 7 | 23 | 2.67E-10 | 10 | 33 | 1.64E-07 | 9 | 20 | 2.01E-07 |
| | 13 | 8 | 26 | 2.23E-07 | 11 | 36 | 1.47E-07 | 9 | 20 | 2.48E-07 |
| 30000 | 1 | 6 | 20 | 6.58E-11 | 4 | 15 | 6.45E-07 | 4 | 10 | 1.16E-09 |
| | 2 | 4 | 14 | 3.41E-07 | 7 | 24 | 2.75E-08 | 4 | 10 | 4.41E-08 |
| | 3 | 6 | 20 | 1.86E-07 | 6 | 21 | 4.01E-08 | 6 | 14 | 2.08E-09 |
| | 4 | 8 | 26 | 1.27E-10 | 8 | 27 | 2.03E-08 | 4 | 10 | 4.5E-08 |
| | 5 | 7 | 23 | 7.57E-08 | 9 | 30 | 1.37E-08 | 6 | 14 | 1.24E-08 |
| | 6 | 7 | 23 | 7.57E-08 | 9 | 30 | 1.37E-08 | 6 | 14 | 1.24E-08 |
| | 7 | 7 | 23 | 7.57E-08 | 9 | 30 | 1.37E-08 | 6 | 14 | 1.24E-08 |
| | 8 | 7 | 23 | 7.62E-08 | 9 | 30 | 1.37E-08 | 6 | 14 | 1.25E-08 |
| | 9 | 7 | 23 | 1.24E-07 | 9 | 30 | 1.36E-08 | 6 | 14 | 1.15E-08 |
| | 10 | 6 | 20 | 4.77E-08 | 7 | 24 | 1.34E-07 | 5 | 12 | 2.29E-09 |
| | 11 | 6 | 20 | 2.32E-08 | 6 | 21 | 4.48E-08 | 5 | 12 | 1.34E-09 |
| | 12 | 7 | 23 | 4.82E-10 | 10 | 33 | 2.83E-07 | 10 | 22 | 7.67E-08 |
| | 13 | 9 | 29 | 8.15E-10 | 11 | 36 | 1.09E-07 | 11 | 24 | 5.39E-07 |
| 50000 | 1 | 6 | 20 | 8.5E-11 | 4 | 15 | 8.33E-07 | 4 | 10 | 1.64E-09 |
| | 2 | 4 | 14 | 3.41E-07 | 7 | 24 | 2.75E-08 | 4 | 10 | 4.41E-08 |
| | 3 | 6 | 20 | 2.39E-07 | 6 | 21 | 5.18E-08 | 6 | 14 | 2.94E-09 |
| | 4 | 8 | 26 | 1.27E-10 | 8 | 27 | 2.04E-08 | 4 | 10 | 4.7E-08 |
| | 5 | 7 | 23 | 9.86E-08 | 9 | 30 | 1.77E-08 | 6 | 14 | 1.77E-08 |
| | 6 | 7 | 23 | 9.86E-08 | 9 | 30 | 1.77E-08 | 6 | 14 | 1.77E-08 |
| | 7 | 7 | 23 | 9.86E-08 | 9 | 30 | 1.77E-08 | 6 | 14 | 1.77E-08 |
| | 8 | 7 | 23 | 9.87E-08 | 9 | 30 | 1.77E-08 | 6 | 14 | 1.77E-08 |
| | 9 | 7 | 23 | 1.11E-07 | 9 | 30 | 1.76E-08 | 6 | 14 | 1.78E-08 |
| | 10 | 6 | 20 | 6.14E-08 | 7 | 24 | 1.73E-07 | 5 | 12 | 3.23E-09 |
| | 11 | 6 | 20 | 3E-08 | 6 | 21 | 5.79E-08 | 5 | 12 | 1.9E-09 |
| | 12 | 7 | 23 | 6.27E-10 | 10 | 33 | 3.65E-07 | 10 | 22 | 2.25E-07 |
| | 13 | 8 | 26 | 2.14E-10 | 10 | 33 | 2.23E-07 | 13 | 28 | 2.68E-07 |
| 80000 | 1 | 6 | 20 | 1.07E-10 | 5 | 18 | 1.04E-08 | 4 | 10 | 3.67E-09 |
| | 2 | 4 | 14 | 3.4E-07 | 7 | 24 | 2.75E-08 | 4 | 10 | 4.41E-08 |
| | 3 | 6 | 20 | 3.03E-07 | 6 | 21 | 6.55E-08 | 6 | 14 | 6.57E-09 |
| | 4 | 8 | 26 | 1.27E-10 | 8 | 27 | 2.04E-08 | 4 | 10 | 4.86E-08 |
| | 5 | 7 | 23 | 1.25E-07 | 9 | 30 | 2.24E-08 | 6 | 14 | 3.97E-08 |
| | 6 | 7 | 23 | 1.25E-07 | 9 | 30 | 2.24E-08 | 6 | 14 | 3.97E-08 |
| | 7 | 7 | 23 | 1.25E-07 | 9 | 30 | 2.24E-08 | 6 | 14 | 3.97E-08 |
| | 8 | 7 | 23 | 1.25E-07 | 9 | 30 | 2.24E-08 | 6 | 14 | 3.97E-08 |
| | 9 | 7 | 23 | 1.34E-07 | 9 | 30 | 2.24E-08 | 6 | 14 | 3.86E-08 |
| | 10 | 6 | 20 | 7.76E-08 | 7 | 24 | 2.18E-07 | 5 | 12 | 7.21E-09 |
| | 11 | 6 | 20 | 3.79E-08 | 6 | 21 | 7.33E-08 | 5 | 12 | 4.25E-09 |
| | 12 | 7 | 23 | 7.96E-10 | 10 | 33 | 4.62E-07 | 10 | 22 | 7.57E-07 |
| | 13 | 8 | 26 | 2.91E-11 | 10 | 33 | 1.13E-07 | 11 | 24 | 5.87E-07 |
| 100000 | 1 | 6 | 20 | 1.2E-10 | 5 | 18 | 1.17E-08 | 4 | 10 | 5.19E-09 |
| | 2 | 4 | 14 | 3.4E-07 | 7 | 24 | 2.75E-08 | 4 | 10 | 4.41E-08 |
| | 3 | 6 | 20 | 3.38E-07 | 6 | 21 | 7.32E-08 | 6 | 14 | 9.29E-09 |
| | 4 | 8 | 26 | 1.27E-10 | 8 | 27 | 2.04E-08 | 4 | 10 | 4.88E-08 |
| | 5 | 7 | 23 | 1.4E-07 | 9 | 30 | 2.5E-08 | 6 | 14 | 5.61E-08 |
| | 6 | 7 | 23 | 1.4E-07 | 9 | 30 | 2.5E-08 | 6 | 14 | 5.61E-08 |
| | 7 | 7 | 23 | 1.4E-07 | 9 | 30 | 2.5E-08 | 6 | 14 | 5.61E-08 |
| | 8 | 7 | 23 | 1.4E-07 | 9 | 30 | 2.5E-08 | 6 | 14 | 5.61E-08 |
| | 9 | 7 | 23 | 1.66E-07 | 9 | 30 | 2.51E-08 | 6 | 14 | 5.86E-08 |
| | 10 | 6 | 20 | 8.67E-08 | 7 | 24 | 2.44E-07 | 5 | 12 | 1.02E-08 |
| | 11 | 6 | 20 | 4.24E-08 | 6 | 21 | 8.19E-08 | 5 | 12 | 6.01E-09 |
| | 12 | 7 | 23 | 8.91E-10 | 10 | 33 | 5.16E-07 | 11 | 24 | 3.03E-08 |
| | 13 | 8 | 26 | 1.35E-12 | 10 | 33 | 5.08E-08 | 15 | 32 | 1.27E-08 |

Table 3: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 3

| Problem 3 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 2 | 7 | 0 | 6 | 21 | 3.66E-08 | 3 | 8 | 5.01E-08 |
| | 2 | 1 | 4 | 0 | 6 | 21 | 1.27E-08 | 3 | 8 | 4.24E-08 |
| | 3 | 1 | 4 | 0 | 7 | 24 | 1.96E-07 | 4 | 10 | 3.26E-07 |
| | 4 | 1 | 4 | 0 | 6 | 21 | 5.53E-08 | 4 | 10 | 4.59E-08 |
| | 5 | 1 | 4 | 0 | 8 | 27 | 7.88E-07 | 4 | 10 | 1.3E-07 |
| | 6 | 1 | 4 | 0 | 8 | 27 | 7.88E-07 | 4 | 10 | 1.3E-07 |
| | 7 | 1 | 4 | 0 | 8 | 27 | 7.88E-07 | 4 | 10 | 1.3E-07 |
| | 8 | 1 | 4 | 0 | 8 | 27 | 7.88E-07 | 4 | 10 | 1.33E-07 |
| | 9 | 1 | 4 | 0 | 8 | 27 | 7.93E-07 | 4 | 10 | 1.19E-07 |
| | 10 | 1 | 4 | 0 | 7 | 24 | 3.01E-07 | 5 | 12 | 1.07E-09 |
| | 11 | 1 | 4 | 0 | 6 | 21 | 9.7E-07 | 4 | 10 | 1.13E-09 |
| | 12 | 2 | 7 | 0 | 9 | 30 | 1.46E-08 | 6 | 14 | 7.28E-08 |
| | 13 | 2 | 7 | 0 | 7 | 24 | 2.31E-07 | 6 | 14 | 1.27E-08 |
| 30000 | 1 | 2 | 7 | 0 | 6 | 21 | 6.34E-08 | 3 | 8 | 1.12E-07 |
| | 2 | 1 | 4 | 0 | 6 | 21 | 1.27E-08 | 3 | 8 | 4.24E-08 |
| | 3 | 1 | 4 | 0 | 7 | 24 | 3.39E-07 | 4 | 10 | 7.29E-07 |
| | 4 | 1 | 4 | 0 | 6 | 21 | 5.53E-08 | 4 | 10 | 4.59E-08 |
| | 5 | 1 | 4 | 0 | 9 | 30 | 1.35E-08 | 4 | 10 | 2.94E-07 |
| | 6 | 1 | 4 | 0 | 9 | 30 | 1.35E-08 | 4 | 10 | 2.94E-07 |
| | 7 | 1 | 4 | 0 | 9 | 30 | 1.35E-08 | 4 | 10 | 2.94E-07 |
| | 8 | 1 | 4 | 0 | 9 | 30 | 1.35E-08 | 4 | 10 | 2.95E-07 |
| | 9 | 1 | 4 | 0 | 9 | 30 | 1.34E-08 | 4 | 10 | 2.81E-07 |
| | 10 | 1 | 4 | 0 | 7 | 24 | 5.22E-07 | 5 | 12 | 2.39E-09 |
| | 11 | 1 | 4 | 0 | 8 | 27 | 5.38E-07 | 4 | 10 | 2.52E-09 |
| | 12 | 2 | 7 | 0 | 9 | 30 | 2.54E-08 | 6 | 14 | 1.63E-07 |
| | 13 | 2 | 7 | 0 | 7 | 24 | 3.39E-07 | 6 | 14 | 2.91E-08 |
| 50000 | 1 | 2 | 7 | 0 | 6 | 21 | 8.18E-08 | 3 | 8 | 1.58E-07 |
| | 2 | 1 | 4 | 0 | 6 | 21 | 1.27E-08 | 3 | 8 | 4.24E-08 |
| | 3 | 1 | 4 | 0 | 7 | 24 | 4.37E-07 | 5 | 12 | 1.03E-09 |
| | 4 | 1 | 4 | 0 | 6 | 21 | 5.53E-08 | 4 | 10 | 4.59E-08 |
| | 5 | 1 | 4 | 0 | 9 | 30 | 1.74E-08 | 4 | 10 | 4.16E-07 |
| | 6 | 1 | 4 | 0 | 9 | 30 | 1.74E-08 | 4 | 10 | 4.16E-07 |
| | 7 | 1 | 4 | 0 | 9 | 30 | 1.74E-08 | 4 | 10 | 4.16E-07 |
| | 8 | 1 | 4 | 0 | 9 | 30 | 1.74E-08 | 4 | 10 | 4.17E-07 |
| | 9 | 1 | 4 | 0 | 9 | 30 | 1.75E-08 | 4 | 10 | 4.12E-07 |
| | 10 | 1 | 4 | 0 | 7 | 24 | 6.74E-07 | 5 | 12 | 3.38E-09 |
| | 11 | 1 | 4 | 0 | 8 | 27 | 6.94E-07 | 4 | 10 | 3.57E-09 |
| | 12 | 2 | 7 | 0 | 9 | 30 | 3.27E-08 | 6 | 14 | 2.31E-07 |
| | 13 | 2 | 7 | 0 | 7 | 24 | 4.2E-07 | 6 | 14 | 4.12E-08 |
| 80000 | 1 | 2 | 7 | 0 | 6 | 21 | 1.03E-07 | 3 | 8 | 3.54E-07 |
| | 2 | 1 | 4 | 0 | 6 | 21 | 1.27E-08 | 3 | 8 | 4.24E-08 |
| | 3 | 1 | 4 | 0 | 7 | 24 | 5.53E-07 | 5 | 12 | 2.3E-09 |
| | 4 | 1 | 4 | 0 | 6 | 21 | 5.53E-08 | 4 | 10 | 4.59E-08 |
| | 5 | 1 | 4 | 0 | 9 | 30 | 2.21E-08 | 4 | 10 | 9.32E-07 |
| | 6 | 1 | 4 | 0 | 9 | 30 | 2.21E-08 | 4 | 10 | 9.32E-07 |
| | 7 | 1 | 4 | 0 | 9 | 30 | 2.21E-08 | 4 | 10 | 9.32E-07 |
| | 8 | 1 | 4 | 0 | 9 | 30 | 2.21E-08 | 4 | 10 | 9.32E-07 |
| | 9 | 1 | 4 | 0 | 9 | 30 | 2.19E-08 | 4 | 10 | 9.42E-07 |
| | 10 | 1 | 4 | 0 | 7 | 24 | 8.53E-07 | 5 | 12 | 7.56E-09 |
| | 11 | 1 | 4 | 0 | 8 | 27 | 8.78E-07 | 4 | 10 | 7.98E-09 |
| | 12 | 2 | 7 | 0 | 9 | 30 | 4.14E-08 | 6 | 14 | 5.16E-07 |
| | 13 | 2 | 7 | 0 | 7 | 24 | 5.19E-07 | 6 | 14 | 9.25E-08 |
| 100000 | 1 | 2 | 7 | 0 | 6 | 21 | 1.16E-07 | 3 | 8 | 5.01E-07 |
| | 2 | 1 | 4 | 0 | 6 | 21 | 1.27E-08 | 3 | 8 | 4.24E-08 |
| | 3 | 1 | 4 | 0 | 7 | 24 | 6.19E-07 | 5 | 12 | 3.26E-09 |
| | 4 | 1 | 4 | 0 | 6 | 21 | 5.53E-08 | 4 | 10 | 4.59E-08 |
| | 5 | 1 | 4 | 0 | 9 | 30 | 2.47E-08 | 5 | 12 | 1.32E-09 |
| | 6 | 1 | 4 | 0 | 9 | 30 | 2.47E-08 | 5 | 12 | 1.32E-09 |
| | 7 | 1 | 4 | 0 | 9 | 30 | 2.47E-08 | 5 | 12 | 1.32E-09 |
| | 8 | 1 | 4 | 0 | 9 | 30 | 2.47E-08 | 5 | 12 | 1.32E-09 |
| | 9 | 1 | 4 | 0 | 9 | 30 | 2.47E-08 | 5 | 12 | 1.32E-09 |
| | 10 | 1 | 4 | 0 | 7 | 24 | 9.53E-07 | 5 | 12 | 1.07E-08 |
| | 11 | 1 | 4 | 0 | 8 | 27 | 9.81E-07 | 4 | 10 | 1.13E-08 |
| | 12 | 2 | 7 | 0 | 9 | 30 | 4.63E-08 | 6 | 14 | 7.3E-07 |
| | 13 | 2 | 7 | 0 | 7 | 24 | 5.76E-07 | 6 | 14 | 1.31E-07 |

Table 4: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 4

| Problem 4 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 2 | 2 | 7 | 2.22E-16 | 1 | 4 | 0 | 5 | 11 | 9.88E-09 |
| | 3 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 4 | 15 | 1.56E-08 | 1 | 3 | 0 |
| | 5 | 3 | 10 | 0 | 5 | 18 | 8.83E-07 | 1 | 3 | 0 |
| | 6 | 3 | 10 | 0 | 5 | 18 | 8.83E-07 | 1 | 3 | 0 |
| | 7 | 3 | 10 | 0 | 5 | 18 | 8.83E-07 | 1 | 3 | 0 |
| | 8 | 3 | 10 | 0 | 5 | 18 | 8.85E-07 | 1 | 3 | 0 |
| | 9 | 3 | 10 | 0 | 5 | 18 | 8.31E-07 | 1 | 3 | 0 |
| | 10 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 13 | 1 | 4 | 0 | 9 | 30 | 5.31E-07 | 7 | 16 | 3.34E-07 |
| 30000 | 1 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 2 | 2 | 7 | 2.22E-16 | 1 | 4 | 0 | 5 | 11 | 9.88E-09 |
| | 3 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 4 | 15 | 1.55E-08 | 1 | 3 | 0 |
| | 5 | 3 | 10 | 0 | 6 | 21 | 1.52E-08 | 1 | 3 | 0 |
| | 6 | 3 | 10 | 0 | 6 | 21 | 1.52E-08 | 1 | 3 | 0 |
| | 7 | 3 | 10 | 0 | 6 | 21 | 1.52E-08 | 1 | 3 | 0 |
| | 8 | 3 | 10 | 0 | 6 | 21 | 1.52E-08 | 1 | 3 | 0 |
| | 9 | 3 | 10 | 0 | 6 | 21 | 1.52E-08 | 1 | 3 | 0 |
| | 10 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 13 | 1 | 4 | 0 | 9 | 30 | 6.13E-07 | 8 | 18 | 3.33E-09 |
| 50000 | 1 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 2 | 2 | 7 | 2.22E-16 | 1 | 4 | 0 | 5 | 11 | 9.88E-09 |
| | 3 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 4 | 15 | 1.54E-08 | 1 | 3 | 0 |
| | 5 | 3 | 10 | 0 | 6 | 21 | 1.96E-08 | 1 | 3 | 0 |
| | 6 | 3 | 10 | 0 | 6 | 21 | 1.96E-08 | 1 | 3 | 0 |
| | 7 | 3 | 10 | 0 | 6 | 21 | 1.96E-08 | 1 | 3 | 0 |
| | 8 | 3 | 10 | 0 | 6 | 21 | 1.96E-08 | 1 | 3 | 0 |
| | 9 | 3 | 10 | 0 | 6 | 21 | 2.11E-08 | 1 | 3 | 0 |
| | 10 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 13 | 1 | 4 | 0 | 9 | 30 | 6.41E-07 | 7 | 16 | 1.39E-07 |
| 80000 | 1 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 2 | 2 | 7 | 2.22E-16 | 1 | 4 | 0 | 5 | 11 | 9.88E-09 |
| | 3 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 4 | 15 | 1.54E-08 | 1 | 3 | 0 |
| | 5 | 3 | 10 | 0 | 6 | 21 | 2.48E-08 | 1 | 3 | 0 |
| | 6 | 3 | 10 | 0 | 6 | 21 | 2.48E-08 | 1 | 3 | 0 |
| | 7 | 3 | 10 | 0 | 6 | 21 | 2.48E-08 | 1 | 3 | 0 |
| | 8 | 3 | 10 | 0 | 6 | 21 | 2.48E-08 | 1 | 3 | 0 |
| | 9 | 3 | 10 | 0 | 6 | 21 | 2.46E-08 | 1 | 3 | 0 |
| | 10 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 13 | 1 | 4 | 0 | 9 | 30 | 6.73E-07 | 8 | 18 | 1.8E-08 |
| 100000 | 1 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 2 | 2 | 7 | 2.22E-16 | 1 | 4 | 0 | 5 | 11 | 9.88E-09 |
| | 3 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 4 | 15 | 1.54E-08 | 1 | 3 | 0 |
| | 5 | 3 | 10 | 0 | 6 | 21 | 2.77E-08 | 1 | 3 | 0 |
| | 6 | 3 | 10 | 0 | 6 | 21 | 2.77E-08 | 1 | 3 | 0 |
| | 7 | 3 | 10 | 0 | 6 | 21 | 2.77E-08 | 1 | 3 | 0 |
| | 8 | 3 | 10 | 0 | 6 | 21 | 2.77E-08 | 1 | 3 | 0 |
| | 9 | 3 | 10 | 0 | 6 | 21 | 2.83E-08 | 1 | 3 | 0 |
| | 10 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 2 | 7 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 3 | 10 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 13 | 1 | 4 | 0 | 9 | 30 | 6.94E-07 | 8 | 18 | 4.76E-07 |

Table 5: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 5

| Problem 5 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 2 | 8 | 5.13E-10 | 5 | 18 | 6.35E-07 | 4 | 10 | 2.31E-08 |
| | 2 | 2 | 8 | 5.53E-10 | 5 | 18 | 6.59E-07 | 4 | 10 | 2.17E-08 |
| | 3 | 1 | 5 | 2.03E-08 | 4 | 15 | 3.45E-07 | 3 | 8 | 3.48E-07 |
| | 4 | 2 | 8 | 5.52E-10 | 5 | 18 | 6.59E-07 | 4 | 10 | 1.96E-08 |
| | 5 | 2 | 8 | 3.84E-10 | 5 | 18 | 5.43E-07 | 4 | 10 | 2.01E-08 |
| | 6 | 2 | 8 | 3.84E-10 | 5 | 18 | 5.43E-07 | 4 | 10 | 2.01E-08 |
| | 7 | 2 | 8 | 3.84E-10 | 5 | 18 | 5.43E-07 | 4 | 10 | 2.01E-08 |
| | 8 | 2 | 8 | 3.84E-10 | 5 | 18 | 5.43E-07 | 4 | 10 | 2E-08 |
| | 9 | 2 | 8 | 5.4E-10 | 5 | 18 | 5.43E-07 | 4 | 10 | 7.01E-08 |
| | 10 | 2 | 8 | 1.12E-10 | 4 | 15 | 5.85E-07 | 3 | 8 | 5.9E-07 |
| | 11 | 2 | 8 | 3.69E-10 | 5 | 18 | 5.38E-07 | 4 | 10 | 1.96E-08 |
| | 12 | 2 | 8 | 2.52E-10 | 4 | 15 | 7.86E-07 | 3 | 8 | 8.81E-07 |
| | 13 | 2 | 8 | 2.13E-09 | 5 | 18 | 7.03E-07 | 4 | 10 | 2.83E-07 |
| 30000 | 1 | 2 | 8 | 9.86E-11 | 6 | 21 | 5.56E-07 | 4 | 10 | 2.64E-09 |
| | 2 | 2 | 8 | 1.06E-10 | 6 | 21 | 5.77E-07 | 4 | 10 | 2.74E-09 |
| | 3 | 1 | 5 | 3.9E-09 | 4 | 15 | 5.98E-07 | 3 | 8 | 7.25E-07 |
| | 4 | 2 | 8 | 1.06E-10 | 6 | 21 | 5.77E-07 | 4 | 10 | 2.74E-09 |
| | 5 | 2 | 8 | 7.37E-11 | 5 | 18 | 9.4E-07 | 4 | 10 | 2.26E-09 |
| | 6 | 2 | 8 | 7.37E-11 | 5 | 18 | 9.4E-07 | 4 | 10 | 2.26E-09 |
| | 7 | 2 | 8 | 7.37E-11 | 5 | 18 | 9.4E-07 | 4 | 10 | 2.26E-09 |
| | 8 | 2 | 8 | 7.37E-11 | 5 | 18 | 9.4E-07 | 4 | 10 | 2.26E-09 |
| | 9 | 2 | 8 | 1.03E-10 | 5 | 18 | 9.39E-07 | 4 | 10 | 2.27E-09 |
| | 10 | 2 | 8 | 2.13E-11 | 5 | 18 | 5.12E-07 | 4 | 10 | 1.23E-09 |
| | 11 | 2 | 8 | 7.08E-11 | 5 | 18 | 9.32E-07 | 4 | 10 | 2.24E-09 |
| | 12 | 2 | 8 | 4.81E-11 | 5 | 18 | 6.88E-07 | 4 | 10 | 1.65E-09 |
| | 13 | 2 | 8 | 4.11E-10 | 6 | 21 | 6.15E-07 | 4 | 10 | 3.16E-09 |
| 50000 | 1 | 2 | 8 | 4.59E-11 | 6 | 21 | 7.17E-07 | 4 | 10 | 3.74E-09 |
| | 2 | 2 | 8 | 4.94E-11 | 6 | 21 | 7.45E-07 | 4 | 10 | 3.88E-09 |
| | 3 | 2 | 8 | 3.5E-12 | 4 | 15 | 7.72E-07 | 4 | 10 | 1.03E-09 |
| | 4 | 2 | 8 | 4.94E-11 | 6 | 21 | 7.45E-07 | 4 | 10 | 3.88E-09 |
| | 5 | 2 | 8 | 3.43E-11 | 6 | 21 | 6.13E-07 | 4 | 10 | 3.19E-09 |
| | 6 | 2 | 8 | 3.43E-11 | 6 | 21 | 6.13E-07 | 4 | 10 | 3.19E-09 |
| | 7 | 2 | 8 | 3.43E-11 | 6 | 21 | 6.13E-07 | 4 | 10 | 3.19E-09 |
| | 8 | 2 | 8 | 3.43E-11 | 6 | 21 | 6.13E-07 | 4 | 10 | 3.19E-09 |
| | 9 | 2 | 8 | 4.81E-11 | 6 | 21 | 6.13E-07 | 4 | 10 | 3.2E-09 |
| | 10 | 2 | 8 | 9.95E-12 | 5 | 18 | 6.61E-07 | 4 | 10 | 1.74E-09 |
| | 11 | 2 | 8 | 3.3E-11 | 6 | 21 | 6.08E-07 | 4 | 10 | 3.17E-09 |
| | 12 | 2 | 8 | 2.24E-11 | 5 | 18 | 8.88E-07 | 4 | 10 | 2.34E-09 |
| | 13 | 2 | 8 | 1.91E-10 | 6 | 21 | 7.93E-07 | 4 | 10 | 4.26E-09 |
| 80000 | 1 | 2 | 8 | 2.27E-11 | 6 | 21 | 9.07E-07 | 4 | 10 | 8.36E-09 |
| | 2 | 2 | 8 | 2.44E-11 | 6 | 21 | 9.42E-07 | 4 | 10 | 8.68E-09 |
| | 3 | 2 | 8 | 1.77E-12 | 4 | 15 | 9.76E-07 | 4 | 10 | 2.29E-09 |
| | 4 | 2 | 8 | 2.44E-11 | 6 | 21 | 9.42E-07 | 4 | 10 | 8.68E-09 |
| | 5 | 2 | 8 | 1.7E-11 | 6 | 21 | 7.75E-07 | 4 | 10 | 7.14E-09 |
| | 6 | 2 | 8 | 1.7E-11 | 6 | 21 | 7.75E-07 | 4 | 10 | 7.14E-09 |
| | 7 | 2 | 8 | 1.7E-11 | 6 | 21 | 7.75E-07 | 4 | 10 | 7.14E-09 |
| | 8 | 2 | 8 | 1.7E-11 | 6 | 21 | 7.75E-07 | 4 | 10 | 7.14E-09 |
| | 9 | 2 | 8 | 2.38E-11 | 6 | 21 | 7.75E-07 | 4 | 10 | 7.14E-09 |
| | 10 | 2 | 8 | 5.03E-12 | 5 | 18 | 8.36E-07 | 4 | 10 | 3.89E-09 |
| | 11 | 2 | 8 | 1.63E-11 | 6 | 21 | 7.69E-07 | 4 | 10 | 7.08E-09 |
| | 12 | 2 | 8 | 1.11E-11 | 6 | 21 | 5.67E-07 | 4 | 10 | 5.22E-09 |
| | 13 | 2 | 8 | 9.43E-11 | 7 | 24 | 5.07E-07 | 4 | 10 | 9.25E-09 |
| 100000 | 1 | 2 | 8 | 1.62E-11 | 7 | 24 | 5.12E-07 | 4 | 10 | 1.18E-08 |
| | 2 | 2 | 8 | 1.76E-11 | 7 | 24 | 5.32E-07 | 4 | 10 | 1.23E-08 |
| | 3 | 2 | 8 | 1.27E-12 | 5 | 18 | 1.08E-08 | 4 | 10 | 3.24E-09 |
| | 4 | 2 | 8 | 1.76E-11 | 7 | 24 | 5.32E-07 | 4 | 10 | 1.23E-08 |
| | 5 | 2 | 8 | 1.21E-11 | 6 | 21 | 8.67E-07 | 4 | 10 | 1.01E-08 |
| | 6 | 2 | 8 | 1.21E-11 | 6 | 21 | 8.67E-07 | 4 | 10 | 1.01E-08 |
| | 7 | 2 | 8 | 1.21E-11 | 6 | 21 | 8.67E-07 | 4 | 10 | 1.01E-08 |
| | 8 | 2 | 8 | 1.21E-11 | 6 | 21 | 8.67E-07 | 4 | 10 | 1.01E-08 |
| | 9 | 2 | 8 | 1.7E-11 | 6 | 21 | 8.67E-07 | 4 | 10 | 1.01E-08 |
| | 10 | 2 | 8 | 3.52E-12 | 5 | 18 | 9.35E-07 | 4 | 10 | 5.5E-09 |
| | 11 | 2 | 8 | 1.17E-11 | 6 | 21 | 8.59E-07 | 4 | 10 | 1E-08 |
| | 12 | 2 | 8 | 7.91E-12 | 6 | 21 | 6.34E-07 | 4 | 10 | 7.39E-09 |
| | 13 | 3 | 11 | 2.22E-13 | 7 | 24 | 5.67E-07 | 4 | 10 | 1.31E-08 |

Table 6: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 6

| Problem 6 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 4 | 14 | 6.97E-09 | 4 | 15 | 6.38E-07 | 5 | 12 | 6.06E-08 |
| | 2 | 4 | 14 | 3.94E-07 | 6 | 21 | 1.23E-08 | 5 | 12 | 5.06E-08 |
| | 3 | 7 | 23 | 6.05E-09 | 5 | 18 | 7.36E-08 | 4 | 10 | 8.77E-07 |
| | 4 | 4 | 14 | 3.77E-07 | 8 | 27 | 1.32E-08 | 7 | 16 | 3.37E-09 |
| | 5 | 6 | 20 | 1.38E-07 | 7 | 24 | 1.58E-07 | 5 | 12 | 1.03E-07 |
| | 6 | 6 | 20 | 1.38E-07 | 7 | 24 | 1.58E-07 | 5 | 12 | 1.03E-07 |
| | 7 | 6 | 20 | 1.38E-07 | 7 | 24 | 1.58E-07 | 5 | 12 | 1.03E-07 |
| | 8 | 6 | 20 | 1.38E-07 | 7 | 24 | 1.58E-07 | 5 | 12 | 1.06E-07 |
| | 9 | 6 | 20 | 1.29E-07 | 7 | 24 | 1.71E-07 | 5 | 12 | 1.18E-07 |
| | 10 | 3 | 11 | 3.17E-08 | 5 | 18 | 6.16E-07 | 4 | 10 | 1.54E-07 |
| | 11 | 6 | 19 | 1.44E-07 | 3 | 12 | 2.32E-08 | 2 | 6 | 5.17E-08 |
| | 12 | 6 | 20 | 4.44E-07 | 9 | 30 | 2.26E-07 | 9 | 20 | 7.55E-09 |
| | 13 | 6 | 20 | 9.44E-07 | 7 | 24 | 1.14E-08 | 6 | 14 | 9.08E-07 |
| 30000 | 1 | 4 | 14 | 1.21E-08 | 5 | 18 | 5.88E-09 | 5 | 12 | 1.36E-07 |
| | 2 | 4 | 14 | 6.81E-07 | 6 | 21 | 1.17E-08 | 5 | 12 | 1.09E-07 |
| | 3 | 7 | 23 | 1.05E-08 | 5 | 18 | 1.27E-07 | 5 | 12 | 1.05E-09 |
| | 4 | 4 | 14 | 6.69E-07 | 8 | 27 | 3.78E-08 | 6 | 14 | 1.98E-07 |
| | 5 | 6 | 20 | 2.39E-07 | 7 | 24 | 2.74E-07 | 5 | 12 | 2.33E-07 |
| | 6 | 6 | 20 | 2.39E-07 | 7 | 24 | 2.74E-07 | 5 | 12 | 2.33E-07 |
| | 7 | 6 | 20 | 2.39E-07 | 7 | 24 | 2.74E-07 | 5 | 12 | 2.33E-07 |
| | 8 | 6 | 20 | 2.39E-07 | 7 | 24 | 2.74E-07 | 5 | 12 | 2.34E-07 |
| | 9 | 6 | 20 | 2.31E-07 | 7 | 24 | 2.82E-07 | 5 | 12 | 2.1E-07 |
| | 10 | 3 | 11 | 5.49E-08 | 6 | 21 | 5.67E-09 | 4 | 10 | 3.44E-07 |
| | 11 | 6 | 19 | 2.49E-07 | 3 | 12 | 4.02E-08 | 2 | 6 | 1.16E-07 |
| | 12 | 6 | 20 | 7.61E-07 | 9 | 30 | 3.86E-07 | 9 | 20 | 1.46E-08 |
| | 13 | 9 | 28 | 1.01E-07 | 7 | 24 | 1.31E-08 | 7 | 16 | 1.13E-08 |
| 50000 | 1 | 4 | 14 | 1.56E-08 | 5 | 18 | 7.58E-09 | 5 | 12 | 1.92E-07 |
| | 2 | 4 | 14 | 8.8E-07 | 6 | 21 | 1.15E-08 | 5 | 12 | 1.54E-07 |
| | 3 | 7 | 23 | 1.35E-08 | 5 | 18 | 1.64E-07 | 5 | 12 | 1.49E-09 |
| | 4 | 4 | 14 | 8.69E-07 | 8 | 27 | 4.69E-08 | 9 | 20 | 9.48E-10 |
| | 5 | 6 | 20 | 3.08E-07 | 7 | 24 | 3.53E-07 | 5 | 12 | 3.29E-07 |
| | 6 | 6 | 20 | 3.08E-07 | 7 | 24 | 3.53E-07 | 5 | 12 | 3.29E-07 |
| | 7 | 6 | 20 | 3.08E-07 | 7 | 24 | 3.53E-07 | 5 | 12 | 3.29E-07 |
| | 8 | 6 | 20 | 3.08E-07 | 7 | 24 | 3.54E-07 | 5 | 12 | 3.3E-07 |
| | 9 | 6 | 20 | 3.06E-07 | 7 | 24 | 3.9E-07 | 5 | 12 | 3.03E-07 |
| | 10 | 3 | 11 | 7.09E-08 | 6 | 21 | 7.32E-09 | 4 | 10 | 4.86E-07 |
| | 11 | 6 | 19 | 3.22E-07 | 3 | 12 | 5.19E-08 | 2 | 6 | 1.63E-07 |
| | 12 | 6 | 20 | 9.81E-07 | 9 | 30 | 4.96E-07 | 9 | 20 | 2.03E-08 |
| | 13 | 9 | 28 | 1.3E-07 | 7 | 24 | 1.37E-08 | 7 | 16 | 1.2E-08 |
| 80000 | 1 | 4 | 14 | 1.97E-08 | 5 | 18 | 9.59E-09 | 5 | 12 | 4.29E-07 |
| | 2 | 6 | 20 | 9.33E-12 | 6 | 21 | 1.14E-08 | 5 | 12 | 3.42E-07 |
| | 3 | 7 | 23 | 1.71E-08 | 5 | 18 | 2.08E-07 | 5 | 12 | 3.33E-09 |
| | 4 | 6 | 20 | 9.19E-12 | 8 | 27 | 5.22E-08 | 6 | 14 | 9.37E-08 |
| | 5 | 6 | 20 | 3.9E-07 | 7 | 24 | 4.47E-07 | 5 | 12 | 7.37E-07 |
| | 6 | 6 | 20 | 3.9E-07 | 7 | 24 | 4.47E-07 | 5 | 12 | 7.37E-07 |
| | 7 | 6 | 20 | 3.9E-07 | 7 | 24 | 4.47E-07 | 5 | 12 | 7.37E-07 |
| | 8 | 6 | 20 | 3.9E-07 | 7 | 24 | 4.47E-07 | 5 | 12 | 7.37E-07 |
| | 9 | 6 | 20 | 3.96E-07 | 7 | 24 | 4.38E-07 | 5 | 12 | 7.41E-07 |
| | 10 | 3 | 11 | 8.97E-08 | 6 | 21 | 9.26E-09 | 5 | 12 | 5.82E-10 |
| | 11 | 6 | 19 | 4.07E-07 | 3 | 12 | 6.56E-08 | 2 | 6 | 3.65E-07 |
| | 12 | 9 | 28 | 1.09E-07 | 9 | 30 | 6.27E-07 | 9 | 20 | 4.47E-08 |
| | 13 | 9 | 28 | 1.65E-07 | 7 | 24 | 1.43E-08 | 10 | 22 | 1.38E-08 |
| 100000 | 1 | 4 | 14 | 2.21E-08 | 5 | 18 | 1.07E-08 | 5 | 12 | 6.06E-07 |
| | 2 | 6 | 20 | 1.04E-11 | 6 | 21 | 1.13E-08 | 5 | 12 | 4.84E-07 |
| | 3 | 7 | 23 | 1.91E-08 | 5 | 18 | 2.33E-07 | 5 | 12 | 4.71E-09 |
| | 4 | 6 | 20 | 1.03E-11 | 8 | 27 | 5.35E-08 | 6 | 14 | 9.23E-08 |
| | 5 | 6 | 20 | 4.36E-07 | 7 | 24 | 5E-07 | 6 | 14 | 1.42E-09 |
| | 6 | 6 | 20 | 4.36E-07 | 7 | 24 | 5E-07 | 6 | 14 | 1.42E-09 |
| | 7 | 6 | 20 | 4.36E-07 | 7 | 24 | 5E-07 | 6 | 14 | 1.42E-09 |
| | 8 | 6 | 20 | 4.36E-07 | 7 | 24 | 5E-07 | 6 | 14 | 1.42E-09 |
| | 9 | 6 | 20 | 4.45E-07 | 7 | 24 | 4.78E-07 | 6 | 14 | 1.46E-09 |
| | 10 | 3 | 11 | 1E-07 | 6 | 21 | 1.03E-08 | 5 | 12 | 8.23E-10 |
| | 11 | 6 | 19 | 4.55E-07 | 3 | 12 | 7.34E-08 | 2 | 6 | 5.17E-07 |
| | 12 | 9 | 28 | 1.22E-07 | 9 | 30 | 7.01E-07 | 9 | 20 | 6.32E-08 |
| | 13 | 9 | 28 | 1.84E-07 | 7 | 24 | 1.46E-08 | 10 | 22 | 1.85E-08 |

Table 7: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 7

| Problem 7 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 1 | 4 | 0 | 4 | 15 | 3.24E-08 | 3 | 8 | 3.76E-07 |
| | 2 | 1 | 4 | 2.22E-16 | 4 | 15 | 1.95E-08 | 6 | 14 | 3.99E-08 |
| | 3 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 6 | 21 | 1.63E-08 | 8 | 18 | 6.59E-09 |
| | 5 | 6 | 19 | 0 | 11 | 36 | 1.34E-08 | 8 | 18 | 7.87E-09 |
| | 6 | 6 | 19 | 0 | 11 | 36 | 1.34E-08 | 8 | 18 | 7.87E-09 |
| | 7 | 6 | 19 | 0 | 11 | 36 | 1.34E-08 | 8 | 18 | 7.87E-09 |
| | 8 | 6 | 19 | 0 | 11 | 36 | 1.42E-08 | 8 | 18 | 8.52E-09 |
| | 9 | 6 | 19 | 0 | 11 | 36 | 5.79E-09 | 8 | 18 | 1.73E-09 |
| | 10 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 20 | 61 | 0 | 18 | 57 | 1.38E-07 | 13 | 28 | 2.92E-08 |
| | 13 | 2 | 7 | 0 | 47 | 144 | 2.64E-08 | 44 | 90 | 3.65E-09 |
| 30000 | 1 | 1 | 4 | 0 | 4 | 15 | 5.61E-08 | 3 | 8 | 8.41E-07 |
| | 2 | 1 | 4 | 2.22E-16 | 4 | 15 | 1.95E-08 | 6 | 14 | 3.99E-08 |
| | 3 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 6 | 21 | 1.63E-08 | 8 | 18 | 6.56E-09 |
| | 5 | 6 | 19 | 0 | 11 | 36 | 7.22E-08 | 8 | 18 | 1.41E-07 |
| | 6 | 6 | 19 | 0 | 11 | 36 | 7.22E-08 | 8 | 18 | 1.41E-07 |
| | 7 | 6 | 19 | 0 | 11 | 36 | 7.22E-08 | 8 | 18 | 1.41E-07 |
| | 8 | 6 | 19 | 0 | 11 | 36 | 7.32E-08 | 8 | 18 | 1.43E-07 |
| | 9 | 6 | 19 | 0 | 11 | 36 | 2.14E-07 | 8 | 18 | 1.34E-07 |
| | 10 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 24 | 73 | 0 | 18 | 57 | 2.61E-07 | 13 | 28 | 1.38E-07 |
| | 13 | 2 | 7 | 0 | - | - | - | - | - | - |
| 50000 | 1 | 1 | 4 | 0 | 4 | 15 | 7.25E-08 | 4 | 10 | 2.4E-10 |
| | 2 | 1 | 4 | 2.22E-16 | 4 | 15 | 1.95E-08 | 6 | 14 | 3.99E-08 |
| | 3 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 6 | 21 | 1.63E-08 | 8 | 18 | 6.55E-09 |
| | 5 | 6 | 19 | 0 | 11 | 36 | 2.1E-07 | 8 | 18 | 2.52E-07 |
| | 6 | 6 | 19 | 0 | 11 | 36 | 2.1E-07 | 8 | 18 | 2.52E-07 |
| | 7 | 6 | 19 | 0 | 11 | 36 | 2.1E-07 | 8 | 18 | 2.52E-07 |
| | 8 | 6 | 19 | 0 | 11 | 36 | 2.12E-07 | 8 | 18 | 2.54E-07 |
| | 9 | 7 | 22 | 0 | 12 | 39 | 3.99E-09 | 8 | 18 | 1.54E-07 |
| | 10 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 22 | 67 | 0 | 18 | 57 | 3.39E-07 | 13 | 28 | 1.99E-07 |
| | 13 | 2 | 7 | 0 | - | - | - | - | - | - |
| 80000 | 1 | 1 | 4 | 0 | 4 | 15 | 9.17E-08 | 4 | 10 | 5.37E-10 |
| | 2 | 1 | 4 | 2.22E-16 | 4 | 15 | 1.95E-08 | 6 | 14 | 3.99E-08 |
| | 3 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 6 | 21 | 1.63E-08 | 8 | 18 | 6.55E-09 |
| | 5 | 6 | 19 | 0 | 11 | 36 | 4.13E-07 | 8 | 18 | 6.11E-07 |
| | 6 | 6 | 19 | 0 | 11 | 36 | 4.13E-07 | 8 | 18 | 6.11E-07 |
| | 7 | 6 | 19 | 0 | 11 | 36 | 4.13E-07 | 8 | 18 | 6.11E-07 |
| | 8 | 6 | 19 | 0 | 11 | 36 | 4.15E-07 | 8 | 18 | 6.11E-07 |
| | 9 | 6 | 19 | 0 | 11 | 36 | 3.78E-07 | 8 | 18 | 3.7E-07 |
| | 10 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 34 | 103 | 0 | 18 | 57 | 4.29E-07 | 13 | 28 | 4.47E-07 |
| | 13 | 2 | 7 | 0 | - | - | - | - | - | - |
| 100000 | 1 | 1 | 4 | 0 | 4 | 15 | 1.03E-07 | 4 | 10 | 7.6E-10 |
| | 2 | 1 | 4 | 2.22E-16 | 4 | 15 | 1.95E-08 | 6 | 14 | 3.99E-08 |
| | 3 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 4 | 2 | 7 | 0 | 6 | 21 | 1.63E-08 | 8 | 18 | 6.55E-09 |
| | 5 | 6 | 19 | 0 | 11 | 36 | 5.11E-07 | 8 | 18 | 8.65E-07 |
| | 6 | 6 | 19 | 0 | 11 | 36 | 5.11E-07 | 8 | 18 | 8.65E-07 |
| | 7 | 6 | 19 | 0 | 11 | 36 | 5.11E-07 | 8 | 18 | 8.65E-07 |
| | 8 | 6 | 19 | 0 | 11 | 36 | 5.14E-07 | 8 | 18 | 8.66E-07 |
| | 9 | 7 | 22 | 0 | 11 | 36 | 3.55E-07 | 8 | 18 | 9.64E-07 |
| | 10 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 11 | 1 | 4 | 0 | 1 | 4 | 0 | 1 | 3 | 0 |
| | 12 | 33 | 100 | 0 | 18 | 57 | 4.79E-07 | 13 | 28 | 6.32E-07 |
| | 13 | 2 | 7 | 0 | - | - | - | - | - | - |

Table 8: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 8

| Problem 8 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **DIM** | **IP** | **#iter** | **#fval** | **Norm** | **#iter** | **#fval** | **Norm** | **#iter** | **#fval** | **Norm** |
| 10000 | 1 | 7 | 23 | 1.97E-10 | 5 | 18 | 5.56E-09 | 3 | 8 | 3.19E-09 |
| | 2 | 15 | 47 | 7.28E-07 | 33 | 102 | 8.1E-07 | 25 | 52 | 3.21E-07 |
| | 3 | 9 | 28 | 1.05E-07 | 8 | 27 | 1.1E-07 | 5 | 12 | 1.27E-09 |
| | 4 | 14 | 43 | 4.52E-07 | 26 | 81 | 6.39E-07 | 25 | 52 | 8.93E-07 |
| | 5 | 12 | 37 | 1.53E-07 | 29 | 90 | 9.47E-07 | 20 | 42 | 7.64E-07 |
| | 6 | 14 | 43 | 1.5E-07 | 28 | 87 | 7.72E-07 | 20 | 42 | 2.68E-07 |
| | 7 | 12 | 37 | 1.53E-07 | 29 | 90 | 9.47E-07 | 20 | 42 | 7.64E-07 |
| | 8 | 14 | 43 | 1.5E-07 | 28 | 87 | 7.72E-07 | 20 | 42 | 5.52E-07 |
| | 9 | 10 | 32 | 7.5E-07 | 27 | 84 | 5.34E-07 | 22 | 46 | 6.36E-07 |
| | 10 | 6 | 20 | 6.02E-07 | 5 | 18 | 9.19E-09 | 4 | 10 | 1.66E-07 |
| | 11 | 6 | 19 | 1.44E-07 | 3 | 12 | 2.32E-08 | 2 | 6 | 5.17E-08 |
| | 12 | 15 | 46 | 4.43E-07 | 35 | 108 | 6.26E-07 | 26 | 54 | 2.13E-07 |
| | 13 | 15 | 46 | 2.79E-07 | 28 | 87 | 5.37E-07 | 21 | 44 | 8.93E-07 |
| 30000 | 1 | 7 | 23 | 3.41E-10 | 5 | 18 | 9.63E-09 | 3 | 8 | 7.14E-09 |
| | 2 | 14 | 44 | 7.24E-07 | 33 | 102 | 5.24E-07 | 23 | 48 | 6.5E-07 |
| | 3 | 9 | 28 | 1.81E-07 | 8 | 27 | 1.9E-07 | 5 | 12 | 2.84E-09 |
| | 4 | 15 | 46 | 6.12E-07 | 26 | 81 | 5E-07 | 24 | 50 | 6.94E-07 |
| | 5 | 12 | 37 | 1.79E-07 | 26 | 81 | 4.96E-07 | 22 | 46 | 7.76E-07 |
| | 6 | 12 | 38 | 6.76E-07 | 26 | 81 | 5.18E-07 | 20 | 42 | 7.97E-07 |
| | 7 | 12 | 37 | 1.79E-07 | 26 | 81 | 4.96E-07 | 22 | 46 | 7.76E-07 |
| | 8 | 12 | 38 | 6.77E-07 | 26 | 81 | 5.18E-07 | 20 | 42 | 7.68E-07 |
| | 9 | 11 | 34 | 4.6E-07 | 27 | 84 | 9.32E-07 | 24 | 50 | 3.75E-07 |
| | 10 | 9 | 28 | 7.87E-08 | 6 | 21 | 1.5E-07 | 4 | 10 | 3.71E-07 |
| | 11 | 6 | 19 | 2.49E-07 | 3 | 12 | 4.02E-08 | 2 | 6 | 1.16E-07 |
| | 12 | 12 | 37 | 5.87E-07 | 35 | 108 | 5.53E-07 | 25 | 52 | 6.37E-07 |
| | 13 | 12 | 37 | 4.1E-07 | 28 | 87 | 9.44E-07 | 22 | 46 | 6.47E-07 |
| 50000 | 1 | 7 | 23 | 4.41E-10 | 5 | 18 | 1.24E-08 | 3 | 8 | 1.01E-08 |
| | 2 | 13 | 41 | 4.89E-07 | 32 | 99 | 9.82E-07 | 26 | 54 | 3.71E-07 |
| | 3 | 9 | 28 | 2.34E-07 | 8 | 27 | 2.45E-07 | 5 | 12 | 4.02E-09 |
| | 4 | 16 | 49 | 5.15E-07 | 25 | 78 | 9.98E-07 | 24 | 50 | 6.6E-07 |
| | 5 | 12 | 37 | 1.68E-07 | 26 | 81 | 5.82E-07 | 23 | 48 | 7.29E-07 |
| | 6 | 12 | 38 | 4.88E-07 | 26 | 81 | 5.72E-07 | 21 | 44 | 5.65E-07 |
| | 7 | 12 | 37 | 1.68E-07 | 26 | 81 | 5.82E-07 | 23 | 48 | 7.29E-07 |
| | 8 | 12 | 38 | 4.88E-07 | 26 | 81 | 5.72E-07 | 21 | 44 | 5.5E-07 |
| | 9 | 11 | 34 | 6.23E-07 | 28 | 87 | 6.01E-07 | 24 | 50 | 4.87E-07 |
| | 10 | 9 | 28 | 1.02E-07 | 6 | 21 | 1.93E-07 | 4 | 10 | 5.25E-07 |
| | 11 | 6 | 19 | 3.22E-07 | 3 | 12 | 5.19E-08 | 2 | 6 | 1.63E-07 |
| | 12 | 13 | 41 | 4.46E-07 | 32 | 99 | 6.34E-07 | 25 | 52 | 3.23E-07 |
| | 13 | 13 | 41 | 7.36E-07 | 29 | 90 | 6.02E-07 | 22 | 46 | 5.49E-07 |
| 80000 | 1 | 7 | 23 | 5.58E-10 | 5 | 18 | 1.57E-08 | 3 | 8 | 2.26E-08 |
| | 2 | 15 | 46 | 3.38E-07 | 30 | 93 | 6.08E-07 | 25 | 52 | 4.8E-07 |
| | 3 | 9 | 28 | 2.96E-07 | 8 | 27 | 3.1E-07 | 5 | 12 | 8.99E-09 |
| | 4 | 15 | 47 | 6.42E-07 | 26 | 81 | 5.2E-07 | 25 | 52 | 6.87E-07 |
| | 5 | 11 | 35 | 9.66E-07 | 29 | 90 | 6.37E-07 | 22 | 46 | 8.1E-07 |
| | 6 | 12 | 38 | 6.78E-07 | 26 | 81 | 7.31E-07 | 20 | 42 | 2.97E-07 |
| | 7 | 11 | 35 | 9.66E-07 | 29 | 90 | 6.37E-07 | 22 | 46 | 8.1E-07 |
| | 8 | 12 | 38 | 6.82E-07 | 26 | 81 | 7.31E-07 | 20 | 42 | 3.02E-07 |
| | 9 | 11 | 34 | 6.86E-07 | 28 | 87 | 7.61E-07 | 25 | 52 | 7.55E-07 |
| | 10 | 9 | 28 | 1.29E-07 | 6 | 21 | 2.44E-07 | 5 | 12 | 6.28E-10 |
| | 11 | 6 | 19 | 4.07E-07 | 3 | 12 | 6.56E-08 | 2 | 6 | 3.65E-07 |
| | 12 | 14 | 43 | 2.1E-07 | 31 | 96 | 8.78E-07 | 24 | 50 | 7.96E-07 |
| | 13 | 15 | 46 | 3.77E-07 | 29 | 90 | 7.61E-07 | 23 | 48 | 5.46E-07 |
| 100000 | 1 | 7 | 23 | 6.23E-10 | 5 | 18 | 1.76E-08 | 3 | 8 | 3.19E-08 |
| | 2 | 15 | 46 | 5.8E-07 | 29 | 90 | 7.24E-07 | 25 | 52 | 5.47E-07 |
| | 3 | 9 | 28 | 3.31E-07 | 8 | 27 | 3.47E-07 | 5 | 12 | 1.27E-08 |
| | 4 | 15 | 47 | 9.66E-07 | 26 | 81 | 5.43E-07 | 26 | 54 | 7.81E-07 |
| | 5 | 12 | 37 | 6.45E-07 | 27 | 84 | 8.32E-07 | 21 | 44 | 3.93E-07 |
| | 6 | 11 | 35 | 5.27E-07 | 27 | 84 | 7.89E-07 | 20 | 42 | 8.64E-07 |
| | 7 | 12 | 37 | 6.45E-07 | 27 | 84 | 8.32E-07 | 21 | 44 | 3.93E-07 |
| | 8 | 11 | 35 | 5.28E-07 | 27 | 84 | 7.89E-07 | 19 | 40 | 9.97E-07 |
| | 9 | 11 | 34 | 7.63E-07 | 28 | 87 | 8.51E-07 | 26 | 54 | 3.17E-07 |
| | 10 | 9 | 28 | 1.44E-07 | 6 | 21 | 2.73E-07 | 5 | 12 | 8.89E-10 |
| | 11 | 6 | 19 | 4.55E-07 | 3 | 12 | 7.34E-08 | 2 | 6 | 5.17E-07 |
| | 12 | 12 | 38 | 4.11E-07 | 30 | 93 | 9.78E-07 | 28 | 58 | 5.21E-07 |
| | 13 | 15 | 46 | 5.86E-07 | 29 | 90 | 8.51E-07 | 23 | 48 | 6.81E-07 |

Table 9: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 9

| Problem 9 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 10 | 32 | 3.87E-07 | 13 | 42 | 7.7E-08 | 13 | 28 | 1.83E-09 |
| | 2 | 10 | 32 | 4.59E-08 | 13 | 42 | 5.49E-08 | 14 | 30 | 3.09E-08 |
| | 3 | 10 | 32 | 8.42E-08 | 15 | 48 | 4.25E-08 | 10 | 22 | 4.74E-07 |
| | 4 | 9 | 28 | 1.12E-07 | 13 | 42 | 2.92E-08 | 10 | 22 | 6.74E-07 |
| | 5 | 9 | 28 | 1.36E-08 | 11 | 36 | 4.77E-08 | 13 | 28 | 7.31E-07 |
| | 6 | 14 | 44 | 8.41E-09 | 39 | 120 | 7.78E-08 | 14 | 30 | 5.07E-08 |
| | 7 | 9 | 28 | 1.36E-08 | 11 | 36 | 4.77E-08 | 13 | 28 | 7.31E-07 |
| | 8 | 15 | 47 | 8.67E-09 | 33 | 102 | 9.27E-07 | 14 | 30 | 5.12E-08 |
| | 9 | 18 | 56 | 6.02E-09 | 46 | 141 | 3.56E-07 | 13 | 28 | 3.51E-07 |
| | 10 | 12 | 37 | 1.04E-08 | 14 | 45 | 1.69E-08 | 13 | 28 | 1.03E-08 |
| | 11 | 10 | 32 | 2.98E-08 | 15 | 48 | 7.24E-07 | 11 | 24 | 5.18E-08 |
| | 12 | 11 | 34 | 2.74E-08 | 17 | 54 | 5.21E-07 | 14 | 30 | 4.89E-07 |
| | 13 | 11 | 35 | 4.78E-07 | 30 | 93 | 5.55E-07 | 14 | 30 | 7.51E-07 |
| 30000 | 1 | 11 | 35 | 6.23E-09 | 13 | 42 | 1.56E-07 | 13 | 28 | 9.69E-07 |
| | 2 | 9 | 29 | 3.14E-08 | 13 | 42 | 1.17E-07 | 14 | 30 | 2.38E-07 |
| | 3 | 11 | 35 | 3.14E-08 | 19 | 60 | 2.88E-07 | 12 | 26 | 4.11E-09 |
| | 4 | 10 | 32 | 3.51E-12 | 13 | 42 | 1.2E-07 | 14 | 30 | 4.28E-07 |
| | 5 | 10 | 32 | 4.22E-10 | 14 | 45 | 4.31E-07 | 13 | 28 | 1.03E-08 |
| | 6 | 15 | 47 | 4.61E-09 | 43 | 132 | 3.23E-07 | 15 | 32 | 1.06E-08 |
| | 7 | 10 | 32 | 4.22E-10 | 14 | 45 | 4.31E-07 | 13 | 28 | 1.03E-08 |
| | 8 | 15 | 47 | 2.01E-09 | 44 | 135 | 6.86E-08 | 15 | 32 | 9.49E-09 |
| | 9 | 17 | 53 | 1.92E-11 | 52 | 159 | 2.12E-07 | 16 | 34 | 1.47E-08 |
| | 10 | 12 | 38 | 3.82E-09 | 14 | 45 | 1.02E-07 | 14 | 30 | 6.47E-08 |
| | 11 | 14 | 44 | 3.05E-08 | 16 | 51 | 5E-07 | 13 | 28 | 4.54E-09 |
| | 12 | 10 | 32 | 2.88E-07 | 19 | 60 | 1.9E-07 | 16 | 34 | 7.3E-08 |
| | 13 | 14 | 44 | 4.41E-09 | 33 | 102 | 1.39E-07 | 16 | 34 | 4.46E-09 |
| 50000 | 1 | 9 | 29 | 2.43E-07 | 13 | 42 | 2.07E-07 | 16 | 34 | 7.17E-09 |
| | 2 | 10 | 32 | 6.11E-07 | 13 | 42 | 1.35E-07 | 15 | 32 | 6.2E-07 |
| | 3 | 11 | 35 | 6.2E-07 | 18 | 57 | 4.92E-07 | 12 | 26 | 4.21E-08 |
| | 4 | 9 | 29 | 3.87E-08 | 13 | 42 | 1.44E-07 | 14 | 30 | 9.3E-08 |
| | 5 | 9 | 28 | 7.34E-07 | 13 | 42 | 7.84E-07 | 15 | 32 | 6.05E-08 |
| | 6 | 15 | 47 | 1.73E-07 | 47 | 144 | 1.4E-08 | 19 | 40 | 5.9E-09 |
| | 7 | 9 | 28 | 7.34E-07 | 13 | 42 | 7.84E-07 | 15 | 32 | 6.05E-08 |
| | 8 | 15 | 47 | 8.39E-11 | 51 | 156 | 5.4E-08 | 19 | 40 | 5.85E-09 |
| | 9 | 18 | 56 | 3.61E-08 | 67 | 204 | 7.07E-07 | 16 | 34 | 7.55E-08 |
| | 10 | 12 | 38 | 7.16E-09 | 14 | 45 | 2.24E-07 | 14 | 30 | 3.89E-08 |
| | 11 | 14 | 44 | 1.77E-09 | 17 | 54 | 1.8E-08 | 12 | 26 | 9.6E-07 |
| | 12 | 14 | 44 | 3.22E-08 | 18 | 57 | 5.7E-08 | 19 | 40 | 1.42E-07 |
| | 13 | 13 | 41 | 7.79E-12 | 22 | 69 | 2.86E-07 | 15 | 32 | 1.18E-07 |
| 80000 | 1 | 8 | 26 | 2.98E-07 | 13 | 42 | 2.64E-07 | 20 | 42 | 2.18E-07 |
| | 2 | 10 | 32 | 4.09E-07 | 13 | 42 | 1.63E-07 | 21 | 44 | 3.6E-07 |
| | 3 | 13 | 41 | 1.15E-08 | 16 | 51 | 2.78E-07 | 15 | 32 | 1.81E-07 |
| | 4 | 9 | 29 | 3.02E-08 | 13 | 42 | 1.71E-07 | 20 | 42 | 1.18E-09 |
| | 5 | 8 | 26 | 6.97E-08 | 14 | 45 | 1.91E-07 | 17 | 36 | 3.78E-08 |
| | 6 | 15 | 47 | 1.55E-08 | 52 | 159 | 8.24E-08 | 19 | 40 | 6.08E-08 |
| | 7 | 8 | 26 | 6.97E-08 | 14 | 45 | 1.91E-07 | 17 | 36 | 3.78E-08 |
| | 8 | 14 | 44 | 4.63E-09 | 51 | 156 | 3.74E-08 | 19 | 40 | 6.08E-08 |
| | 9 | 20 | 62 | 1.58E-08 | 70 | 213 | 2.36E-08 | 20 | 42 | 9.58E-09 |
| | 10 | 12 | 38 | 1.61E-08 | 14 | 45 | 4.47E-07 | 17 | 36 | 1.32E-07 |
| | 11 | 15 | 47 | 2.27E-07 | 18 | 57 | 4.13E-07 | 14 | 30 | 2.39E-07 |
| | 12 | 12 | 38 | 7.03E-07 | 19 | 60 | 1.99E-08 | 18 | 38 | 1.28E-08 |
| | 13 | 15 | 47 | 1.79E-10 | 25 | 78 | 6.73E-08 | 19 | 40 | 2.01E-09 |
| 100000 | 1 | 8 | 26 | 2.9E-07 | 13 | 42 | 2.97E-07 | 21 | 44 | 1.31E-07 |
| | 2 | 12 | 38 | 1.61E-10 | 13 | 42 | 1.81E-07 | 24 | 50 | 6.59E-08 |
| | 3 | 15 | 46 | 9.59E-07 | 17 | 54 | 1.88E-08 | 17 | 36 | 2.27E-07 |
| | 4 | 11 | 35 | 2.72E-08 | 13 | 42 | 1.87E-07 | 24 | 50 | 1.32E-07 |
| | 5 | 8 | 26 | 4.9E-08 | 14 | 45 | 2.18E-07 | 17 | 36 | 1.26E-07 |
| | 6 | 15 | 47 | 8.1E-09 | 54 | 165 | 1.55E-08 | 17 | 36 | 2.04E-08 |
| | 7 | 8 | 26 | 4.9E-08 | 14 | 45 | 2.18E-07 | 17 | 36 | 1.26E-07 |
| | 8 | 13 | 41 | 1.44E-08 | 55 | 168 | 3.3E-08 | 17 | 36 | 2.02E-08 |
| | 9 | 19 | 59 | 3.58E-07 | 73 | 222 | 7.75E-07 | 20 | 42 | 8.39E-09 |
| | 10 | 12 | 38 | 2.32E-08 | 14 | 45 | 5.56E-07 | 19 | 40 | 1.63E-08 |
| | 11 | 14 | 44 | 2.91E-07 | 17 | 54 | 2.79E-07 | 16 | 34 | 4.66E-09 |
| | 12 | 12 | 38 | 1.63E-09 | 19 | 60 | 1.72E-07 | 20 | 42 | 8.53E-08 |
| | 13 | 15 | 47 | 5.83E-11 | 23 | 72 | 1.77E-07 | 19 | 40 | 4.3E-07 |

Table 10: Numerical results of NISPM, DAIS1 and MSGP methods for Problem 10

| Problem 10 | | NISPM | | | DAIS1 | | | MSGP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DIM | IP | #iter | #fval | Norm | #iter | #fval | Norm | #iter | #fval | Norm |
| 10000 | 1 | 1 | 4 | 0 | 4 | 15 | 3.83E-07 | 3 | 8 | 5E-07 |
| | 2 | 2 | 7 | 2.22E-16 | 8 | 25 | 8.11E-08 | 6 | 13 | 9.86E-07 |
| | 3 | 2 | 7 | 0 | 9 | 30 | 1.69E-07 | 7 | 16 | 1.12E-09 |
| | 4 | 2 | 7 | 0 | 8 | 27 | 8.08E-07 | 5 | 12 | 6.67E-08 |
| | 5 | 2 | 7 | 0 | 8 | 27 | 1.32E-07 | 7 | 16 | 2.43E-08 |
| | 6 | 2 | 7 | 0 | 8 | 27 | 1.32E-07 | 7 | 16 | 2.43E-08 |
| | 7 | 2 | 7 | 0 | 8 | 27 | 1.32E-07 | 7 | 16 | 2.43E-08 |
| | 8 | 2 | 7 | 0 | 8 | 27 | 1.33E-07 | 7 | 16 | 2.44E-08 |
| | 9 | 2 | 7 | 0 | 8 | 27 | 1.35E-07 | 7 | 16 | 4.2E-08 |
| | 10 | 2 | 7 | 0 | 7 | 24 | 5.9E-08 | 7 | 16 | 1.12E-08 |
| | 11 | 1 | 4 | 0 | 6 | 21 | 2.31E-08 | 4 | 10 | 9.43E-08 |
| | 12 | 3 | 10 | 0 | 11 | 36 | 4.66E-08 | 9 | 20 | 1.24E-09 |
| | 13 | 2 | 7 | 0 | 9 | 30 | 5.38E-07 | 12 | 26 | 4.01E-07 |
| 30000 | 1 | 1 | 4 | 0 | 4 | 15 | 6.64E-07 | 4 | 10 | 1.11E-09 |
| | 2 | 2 | 7 | 2.22E-16 | 8 | 25 | 8.11E-08 | 6 | 13 | 9.86E-07 |
| | 3 | 2 | 7 | 0 | 9 | 30 | 2.93E-07 | 7 | 16 | 2.51E-09 |
| | 4 | 2 | 7 | 0 | 8 | 27 | 8.09E-07 | 5 | 12 | 7.1E-08 |
| | 5 | 2 | 7 | 0 | 8 | 27 | 2.29E-07 | 7 | 16 | 5.44E-08 |
| | 6 | 2 | 7 | 0 | 8 | 27 | 2.29E-07 | 7 | 16 | 5.44E-08 |
| | 7 | 2 | 7 | 0 | 8 | 27 | 2.29E-07 | 7 | 16 | 5.44E-08 |
| | 8 | 2 | 7 | 0 | 8 | 27 | 2.3E-07 | 7 | 16 | 5.45E-08 |
| | 9 | 2 | 7 | 0 | 8 | 27 | 2.36E-07 | 7 | 16 | 6.54E-08 |
| | 10 | 2 | 7 | 0 | 7 | 24 | 1.02E-07 | 7 | 16 | 2.51E-08 |
| | 11 | 1 | 4 | 0 | 6 | 21 | 4E-08 | 4 | 10 | 2.11E-07 |
| | 12 | 3 | 10 | 0 | 11 | 36 | 8.06E-08 | 9 | 20 | 2.77E-09 |
| | 13 | 2 | 7 | 0 | 9 | 30 | 5.71E-07 | 7 | 16 | 1.85E-09 |
| 50000 | 1 | 1 | 4 | 0 | 4 | 15 | 8.57E-07 | 4 | 10 | 1.57E-09 |
| | 2 | 2 | 7 | 2.22E-16 | 8 | 25 | 8.11E-08 | 6 | 13 | 9.86E-07 |
| | 3 | 2 | 7 | 0 | 9 | 30 | 3.78E-07 | 7 | 16 | 3.54E-09 |
| | 4 | 2 | 7 | 0 | 8 | 27 | 8.09E-07 | 5 | 12 | 7.16E-08 |
| | 5 | 2 | 7 | 0 | 8 | 27 | 2.96E-07 | 7 | 16 | 7.7E-08 |
| | 6 | 2 | 7 | 0 | 8 | 27 | 2.96E-07 | 7 | 16 | 7.7E-08 |
| | 7 | 2 | 7 | 0 | 8 | 27 | 2.96E-07 | 7 | 16 | 7.7E-08 |
| | 8 | 2 | 7 | 0 | 8 | 27 | 2.96E-07 | 7 | 16 | 7.7E-08 |
| | 9 | 2 | 7 | 0 | 8 | 27 | 2.88E-07 | 7 | 16 | 7.56E-08 |
| | 10 | 2 | 7 | 0 | 7 | 24 | 1.32E-07 | 7 | 16 | 3.55E-08 |
| | 11 | 1 | 4 | 0 | 6 | 21 | 5.16E-08 | 4 | 10 | 2.98E-07 |
| | 12 | 3 | 10 | 0 | 11 | 36 | 1.04E-07 | 9 | 20 | 3.92E-09 |
| | 13 | 2 | 7 | 0 | 9 | 30 | 5.77E-07 | 7 | 16 | 2.6E-09 |
| 80000 | 1 | 1 | 4 | 0 | 5 | 18 | 1.07E-08 | 4 | 10 | 3.51E-09 |
| | 2 | 2 | 7 | 2.22E-16 | 8 | 25 | 8.11E-08 | 6 | 13 | 9.86E-07 |
| | 3 | 2 | 7 | 0 | 9 | 30 | 4.78E-07 | 7 | 16 | 7.93E-09 |
| | 4 | 2 | 7 | 0 | 8 | 27 | 8.09E-07 | 5 | 12 | 7.2E-08 |
| | 5 | 2 | 7 | 0 | 8 | 27 | 3.75E-07 | 7 | 16 | 1.72E-07 |
| | 6 | 2 | 7 | 0 | 8 | 27 | 3.75E-07 | 7 | 16 | 1.72E-07 |
| | 7 | 2 | 7 | 0 | 8 | 27 | 3.75E-07 | 7 | 16 | 1.72E-07 |
| | 8 | 2 | 7 | 0 | 8 | 27 | 3.75E-07 | 7 | 16 | 1.72E-07 |
| | 9 | 2 | 7 | 0 | 8 | 27 | 3.64E-07 | 7 | 16 | 1.73E-07 |
| | 10 | 2 | 7 | 0 | 7 | 24 | 1.67E-07 | 7 | 16 | 7.94E-08 |
| | 11 | 1 | 4 | 0 | 6 | 21 | 6.53E-08 | 4 | 10 | 6.67E-07 |
| | 12 | 3 | 10 | 0 | 11 | 36 | 1.32E-07 | 9 | 20 | 8.77E-09 |
| | 13 | 2 | 7 | 0 | 9 | 30 | 5.84E-07 | 7 | 16 | 5.78E-09 |
| 100000 | 1 | 1 | 4 | 0 | 5 | 18 | 1.2E-08 | 4 | 10 | 4.96E-09 |
| | 2 | 2 | 7 | 2.22E-16 | 8 | 25 | 8.11E-08 | 6 | 13 | 9.86E-07 |
| | 3 | 2 | 7 | 0 | 9 | 30 | 5.35E-07 | 7 | 16 | 1.12E-08 |
| | 4 | 2 | 7 | 0 | 8 | 27 | 8.09E-07 | 5 | 12 | 7.21E-08 |
| | 5 | 2 | 7 | 0 | 8 | 27 | 4.19E-07 | 7 | 16 | 2.44E-07 |
| | 6 | 2 | 7 | 0 | 8 | 27 | 4.19E-07 | 7 | 16 | 2.44E-07 |
| | 7 | 2 | 7 | 0 | 8 | 27 | 4.19E-07 | 7 | 16 | 2.44E-07 |
| | 8 | 2 | 7 | 0 | 8 | 27 | 4.19E-07 | 7 | 16 | 2.44E-07 |
| | 9 | 2 | 7 | 0 | 8 | 27 | 4.14E-07 | 7 | 16 | 2.42E-07 |
| | 10 | 2 | 7 | 0 | 7 | 24 | 1.87E-07 | 7 | 16 | 1.12E-07 |
| | 11 | 1 | 4 | 0 | 6 | 21 | 7.3E-08 | 4 | 10 | 9.43E-07 |
| | 12 | 3 | 10 | 0 | 11 | 36 | 1.47E-07 | 9 | 20 | 1.24E-08 |
| | 13 | 2 | 7 | 0 | 9 | 30 | 5.89E-07 | 7 | 16 | 8.16E-09 |