9 points difference scheme(2-order bound) program

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Grid size: 11x11

Grid spacing: dx = 0.1, dy = 0.1

Program execution started with 9 points difference shceme(2-order bound) ....

Setting boundary conditions...

Setting interior points with consistent 6th-order 9 points difference shceme ...

Matrix initialization completed.

Total equations: 121

for 9 points difference shceme(2-order bound) ,Interior points: 49

Iteration = 0, Convergence error = 5.500e+000, L1 error = 8.378e+000

VTK document output: 9 points difference shceme(2-order bound) 11x11_000000.vtk

Steady state reached!

Final iteration: 590, Final convergence error : 9.713e-011

Final L1 error: 1.911e-004

VTK document output: 9 points difference shceme(2-order bound) 11x11_000590.vtk

Grid size 11x11 computation completed

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Grid size: 21x21

Grid spacing: dx = 5.000e-002, dy = 5.000e-002

Program execution started with 9 points difference shceme(2-order bound) ....

Setting boundary conditions...

Setting interior points with consistent 6th-order 9 points difference shceme ...

Matrix initialization completed.

Total equations: 441

for 9 points difference shceme(2-order bound) ,Interior points: 289

Iteration = 0, Convergence error = 5.500e+000, L1 error = 9.190e+000

VTK document output: 9 points difference shceme(2-order bound) 21x21_000000.vtk

Iteration = 1000, Convergence error = 8.988e-006, L1 error = 3.191e-004

Iteration = 2000, Convergence error = 4.900e-010, L1 error = 1.512e-005

Steady state reached!

Final iteration: 2162, Final convergence error : 9.988e-011

Final L1 error: 1.513e-005

VTK document output: 9 points difference shceme(2-order bound) 21x21_002162.vtk

Grid size 21x21 computation completed

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Grid size: 41x41

Grid spacing: dx = 2.500e-002, dy = 2.500e-002

Program execution started with 9 points difference shceme(2-order bound) ....

Setting boundary conditions...

Setting interior points with consistent 6th-order 9 points difference shceme ...

Matrix initialization completed.

Total equations: 1681

for 9 points difference shceme(2-order bound) ,Interior points: 1369

Iteration = 0, Convergence error = 8.800e+000, L1 error = 9.286e+000

VTK document output: 9 points difference shceme(2-order bound) 41x41_000000.vtk

Iteration = 1000, Convergence error = 5.910e-004, L1 error = 4.608e-002

Iteration = 2000, Convergence error = 4.262e-006, L1 error = 3.313e-004

Iteration = 3000, Convergence error = 3.074e-008, L1 error = 1.896e-006

Iteration = 4000, Convergence error = 2.217e-010, L1 error = 1.040e-006

Steady state reached!

Final iteration: 4162, Final convergence error : 9.970e-011

Final L1 error: 1.049e-006

VTK document output: 9 points difference shceme(2-order bound) 41x41_004162.vtk

Grid size 41x41 computation completed

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Grid size: 81x81

Grid spacing: dx = 1.250e-002, dy = 1.250e-002

Program execution started with 9 points difference shceme(2-order bound) ....

Setting boundary conditions...

Setting interior points with consistent 6th-order 9 points difference shceme ...

Matrix initialization completed.

Total equations: 6561

for 9 points difference shceme(2-order bound) ,Interior points: 5929

Iteration = 0, Convergence error = 1.320e+001, L1 error = 9.569e+000

VTK document output: 9 points difference shceme(2-order bound) 81x81_000000.vtk

Iteration = 1000, Convergence error = 2.865e-003, L1 error = 4.072e-001

Iteration = 2000, Convergence error = 1.783e-004, L1 error = 2.533e-002

Iteration = 3000, Convergence error = 1.109e-005, L1 error = 1.575e-003

Iteration = 4000, Convergence error = 6.895e-007, L1 error = 9.788e-005

Iteration = 5000, Convergence error = 4.288e-008, L1 error = 6.022e-006

VTK document output: 9 points difference shceme(2-order bound) 81x81_005000.vtk

Iteration = 6000, Convergence error = 2.667e-009, L1 error = 3.295e-007

Iteration = 7000, Convergence error = 1.659e-010, L1 error = 5.014e-008

Steady state reached!

Final iteration: 7183, Final convergence error : 9.977e-011

Final L1 error: 5.558e-008

VTK document output: 9 points difference shceme(2-order bound) 81x81_007183.vtk

Grid size 81x81 computation completed

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Data file output: grid_convergence_9 points difference shceme(2-order bound).dat

Gnuplot script output: plot_convergence_9 points difference shceme(2-order bound).plt

=== Improved Grid Convergence Analysis ===

Linear regression results:

Slope = 3.909 (theoretical 4.0)

Order of accuracy = 3.909

All computations completed!