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DATE 14-02-2025 16 25 24 USER FRTRN90 JOB BNCHMRK PAGE 0000

BNCHMRK FRTRN90 FILE NAME/TYPE TESTIN/TEST4.F90

BNCHMRK FRTRN90

BNCHMRK FRTRN90 CREATION DATE/TIME 14-02-2025 16 25 24

BNCHMRK FRTRN90

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BNCHMRK FRTRN90

BNCHMRK FRTRN90 SYSTEM LINUX 6.11.2-AMD64

BNCHMRK FRTRN90

BNCHMRK FRTRN90 SYSID ACID SYSUSER ACID

BNCHMRK FRTRN90

BNCHMRK FRTRN90 FORM STANDARD

BNCHMRK FRTRN90

BNCHMRK FRTRN90 CHAR FONT1403

BNCHMRK FRTRN90

BNCHMRK FRTRN90 PRT1403 VERSION 1.2

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1 PROGRAM LID DRIVEN CAVITY
2 IMPLICIT NONE
3 INTEGER, PARAMETER N = 50 GRID SIZE NXN GRID
4 REAL DX, DY, DT, RE GRID SPACING, TIME STEP, REYNOLDS NUMBER
5 REAL U N, N, V N, N, P N, N VELOCITY AND PRESSURE FIELDS
6 INTEGER I, J, STEP
7 REAL START TIME, END TIME, ELAPSED TIME
8
9 PARAMETERS
10 DX 1.0 / N-1 GRID SPACING IN X DIRECTION
11 DY 1.0 / N-1 GRID SPACING IN Y DIRECTION
12 DT 0.001 TIME STEP SIZE
13 RE 100 REYNOLDS NUMBER
14
15 INITIALIZE ARRAYS
16 U 0.0
17 V 0.0
18 P 0.0
19
20 INITIALIZE THE TOP BOUNDARY LID VELOCITY
21 U N, 1.0
22
23 START TIMING
24 CALL CPU TIME START TIME
25
26 MAIN LOOP FOR TIME STEPPING
27 DO STEP 1, 1000
28 CALL COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
29 CALL UPDATE PRESSURE P, DX, DY
30
31 OUTPUT OR CHECK CONVERGENCE
32 IF MOD STEP, 100 0 THEN
33 PRINT *, STEP, STEP
34 END IF
35 END DO
36
37 STOP TIMING
38 CALL CPU TIME END TIME
39 ELAPSED TIME END TIME - START TIME
40 PRINT *, ELAPSED TIME FOR CFD SIMULATION, ELAPSED TIME, SECONDS
41
42 CONTAINS
43
44 FUNCTION TO UPDATE THE VELOCITY AND PRESSURE FIELDS SIMPLIFIED
45 SUBROUTINE COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
46 REAL, DIMENSION, , INTENT INOUT U, V, P
47 REAL, INTENT IN DX, DY, DT, RE
48 INTEGER I, J
49
50 SIMPLE EXPLICIT METHOD FOR VELOCITY SIMPLIFIED
51 DO I 2, N-1
52 DO J 2, N-1
53 U I, J = U I, J - DT * (U I+1, J - U I-1, J) / 2*DX
54 V I, J = V I, J - DT * (U I, J+1 - U I, J-1) / 2*DY
55 END DO
56 END DO
57
58 SIMPLE VELOCITY UPDATE FOR V SIMILAR
59 DO I 2, N-1
60 DO J 2, N-1
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1      V I, J      V I, J - DT *      U I, J * V I+1, J - V I-1, J      / 2*DX
2      V I, J * V I, J+1 - V I, J-1      / 2*DY
3      END DO
4      END DO
5      END SUBROUTINE COMPUTE VELOCITY
6
7      FUNCTION TO SOLVE FOR PRESSURE SIMPLIFIED POISSON EQUATION SOLVER
8      SUBROUTINE UPDATE PRESSURE P, DX, DY
9      REAL, DIMENSION , , INTENT INOUT      P
10     REAL, INTENT IN      DX, DY
11     INTEGER      I, J
12
13     SIMPLE PRESSURE POISSON EQUATION JACOBI ITERATION
14     DO I      2, N-1
15         DO J      2, N-1
16             P I, J      0.25 *      P I+1, J + P I-1, J + P I, J+1 + P I, J-1
17         END DO
18     END DO
19     END SUBROUTINE UPDATE PRESSURE
20
21 END PROGRAM LID DRIVEN CAVITY
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