

# Unit 14 - Week 12: SIMPLE Algorithm

## Course outline

How does an NPTEL online course work?

Week 0: Prerequisite

Week 1: Introduction to Computational Fluid Dynamics

Week 2: Classification of PDEs

Week 3: Finite Difference Method

Week 4: Elliptic Equations

Week 5: Parabolic Equations

Week 6: Hyperbolic Equations

Week 7: Stability Analysis

Week 8: Vorticity-Stream Function Formulation

Week 9: MAC Algorithm

Week 10: Finite Volume Method - I

Week 11: Finite volume method - II

Week 12: SIMPLE Algorithm

- Lec 1: Solution of Navier-Stokes Equations using FVM
- Lec 2: Solution of Navier-Stokes Equations using FVM - II
- Lec 3: Boundary Conditions
- Quiz : Assignment 12
- Feedback form for week 12

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## Assignment 12

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2020-04-22, 23:59 IST.**

1) The pressure term in discretized x-momentum equation for cell center P on uniform grid is

1 point

- $(p_e - p_w)\Delta y$
- $(p_w - p_e)\Delta y$
- $(p_e - p_w)\Delta x$
- $(p_w - p_e)\Delta x$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $(p_w - p_e)\Delta y$

2) The discretized continuity equation for cell center P on uniform three-dimensional grid can be written as

1 point

- $(u_e - u_w)\Delta y\Delta z + (v_n - v_s)\Delta x\Delta z + (w_t - w_b)\Delta x\Delta y = 0$
- $(u_e - u_w)\Delta x\Delta y + (v_n - v_s)\Delta y\Delta z + (w_t - w_b)\Delta z\Delta x = 0$
- $(u_w - u_e)\Delta x\Delta y + (v_n - v_s)\Delta y\Delta z + (w_t - w_b)\Delta z\Delta x = 0$
- $(u_w - u_e)\Delta x\Delta y + (v_s - v_n)\Delta y\Delta z + (w_t - w_b)\Delta z\Delta x = 0$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $(u_e - u_w)\Delta y\Delta z + (v_n - v_s)\Delta x\Delta z + (w_t - w_b)\Delta x\Delta y = 0$

3) In SIMPLE algorithm, correction u-velocity at east face center of main control volume P is written as

1 point

- $u'_e = (p'_E - p'_P)\frac{\Delta y}{a_e}$
- $u'_e = (p'_P - p'_E)\frac{\Delta y}{a_e}$
- $u'_e = (p'_E - p'_P)\frac{\Delta y}{a_e - \sum a_{nb}}$
- $u'_e = (p'_P - p'_E)\frac{\Delta y}{a_e - \sum a_{nb}}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $u'_e = (p'_P - p'_E)\frac{\Delta y}{a_e}$

4) In SIMPLEC algorithm, correction u-velocity at east face center of main control volume P is written as

1 point

- $u'_e = (p'_E - p'_P)\frac{\Delta y}{a_e}$
- $u'_e = (p'_P - p'_E)\frac{\Delta y}{a_e}$
- $u'_e = (p'_E - p'_P)\frac{\Delta y}{a_e - \sum a_{nb}}$
- $u'_e = (p'_P - p'_E)\frac{\Delta y}{a_e - \sum a_{nb}}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $u'_e = (p'_P - p'_E)\frac{\Delta y}{a_e - \sum a_{nb}}$

5) In SIMPLER algorithm, the discretized pressure correction equation in main control volume P is  $a_p p'_p = \sum a_{nb} p'_{nb} + b$  where the expression for b is

1 point

- $b = 0.5(F_w^* - F_e^* + F_s^* - F_n^*)$
- $b = 0.5(F_e^* - F_w^* + F_n^* - F_s^*)$
- $b = F_w^* - F_e^* + F_s^* - F_n^*$
- $b = F_e^* - F_w^* + F_n^* - F_s^*$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $b = F_w^* - F_e^* + F_s^* - F_n^*$

6) In which of the following algorithm(s) the pressure equation is solved?

1 point

- SIMPLE
- SIMPLER
- SIMPLER
- SIMPLEC
- All of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
SIMPLER

7) SIMPLE algorithm proposed by S. V. Patankar uses collocated grid.

1 point

- True
- False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
False

8) SIMPLE algorithm is computationally faster than SIMPLER with same initial guess values.

1 point

- True
- False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
False

9) SIMPLE algorithm was proposed by S. V. Patankar for steady Navier-Stokes equations.

1 point

- True
- False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
True