Unit 6 - Viscoelastic models

Week 5 Assessment

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

Due on 2020-04-01, 23:59 IST.

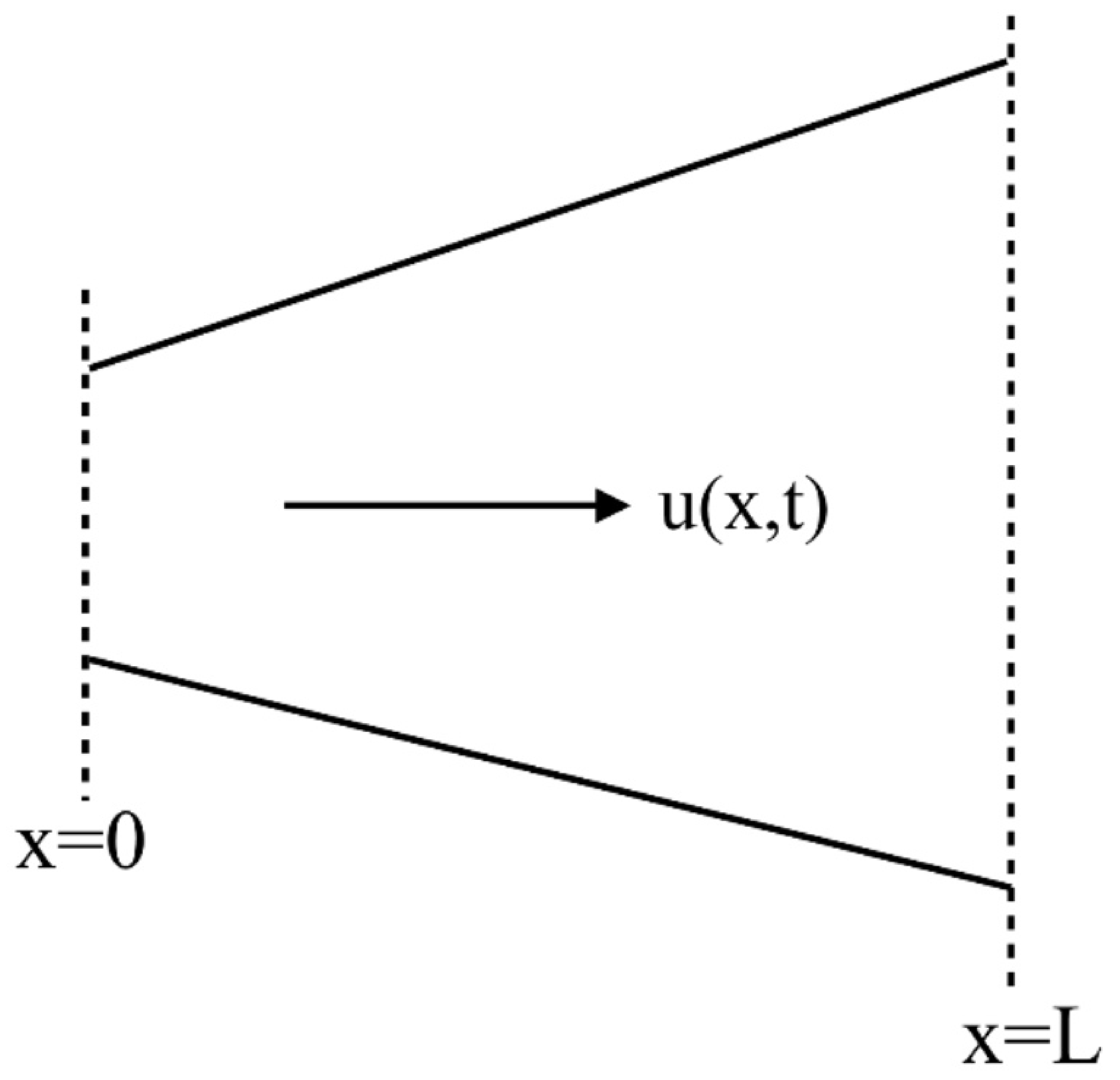
1) The fluid is subdivided into fluid parcels and every fluid parcel is followed as it moves through space and time. Which kind of formulation is this? *1 point*

- Cartesian
- Eulerian
- Lagrangian
- Euclidian

No, the answer is incorrect.
Score: 0
Accepted Answers:
Lagrangian

2) **COMMON DATA FOR QUESTIONS 2 TO 5** *1 point*

When a valve is opened, fluid flows in the expansion duct as shown in figure according to the approximation $V_x = u_o\left(1-\frac{x}{2L}\right) tanh\left(\frac{u_o t}{L}\right)$, the velocity being there only in x-direction.



What is the x-component of acceleration?

- $a_x = \frac{u_o^2}{L}\left(1-\frac{x}{2L}\right)\left[sech^2\left(\frac{u_o t}{L}\right) - \frac{1}{2}tanh^2\left(\frac{u_o t}{L}\right)\right]$
- $a_x = \frac{u_o^2}{L}\left(1-\frac{x}{2L}\right)\left[sech^2\left(\frac{u_o t}{L}\right) - \frac{1}{2}tanh\left(\frac{u_o t}{L}\right)\right]$
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No, the answer is incorrect.
Score: 0
Accepted Answers:
$a_x = \frac{u_o^2}{L}\left(1-\frac{x}{2L}\right)\left[sech^2\left(\frac{u_o t}{L}\right) - \frac{1}{2}tanh^2\left(\frac{u_o t}{L}\right)\right]$

3) What is the acceleration at $(x,t) = \left(\frac{L}{2}, \frac{L}{2u_o}\right)$? *1 point*

- $0.493\frac{u_o^2}{L}$
- $0.509\frac{u_o^2}{L}$
- $0.590\frac{u_o^2}{L}$
- $\frac{u_o^2}{L}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$0.509\frac{u_o^2}{L}$

4) The acceleration of the fluid at x = L and $\frac{u_o t}{L}$=1.146 is zero. Is the given statement true or false? *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers:
True

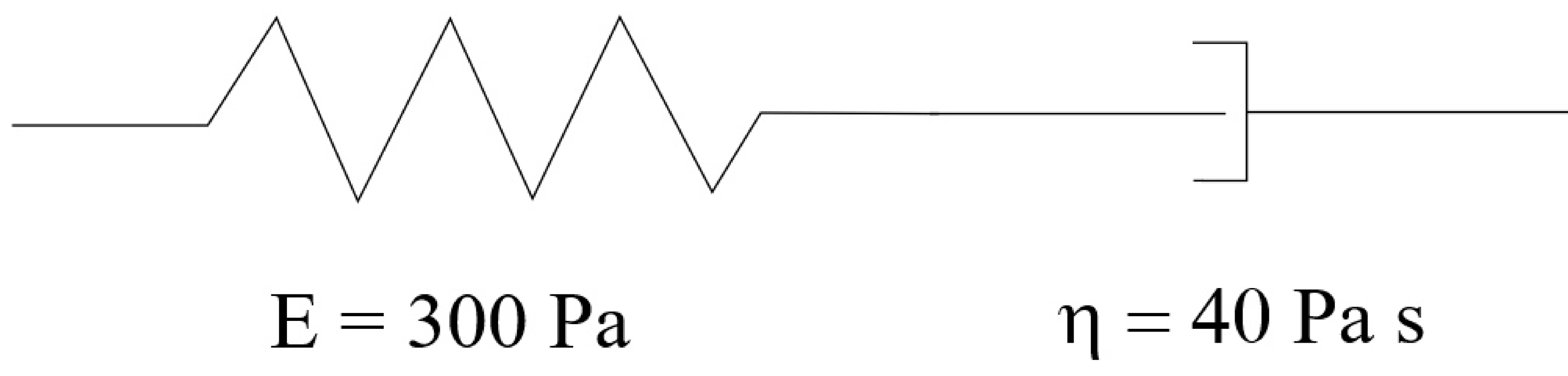
5) Which of the following is the correct statement? *1 point*

- The acceleration starts off negative, then goes through zero and turns negative as the negative convective acceleration overtakes the decaying positive local acceleration.
- The acceleration starts off positive, then goes through zero and remains zero as the negative convective acceleration overtakes the decaying positive local acceleration.
- The acceleration starts off positive, then goes through zero and turns negative as the negative convective acceleration decays the overtaking positive local acceleration.
- The acceleration starts off positive, then goes through zero and turns negative as the negative convective acceleration overtakes the decaying positive local acceleration.

No, the answer is incorrect.
Score: 0
Accepted Answers:
The acceleration starts off positive, then goes through zero and turns negative as the negative convective acceleration overtakes the decaying positive local acceleration.

6) **COMMON DATA FOR QUESTIONS 6 TO 10** *1 point*

For a Maxwell fluid as shown in the figure below, the constitutive model has the form: $p_0\sigma + p_0\dot{\sigma} = q_0\epsilon + q_0\dot{\epsilon}$. Identify the values of the unknown coefficients correctly.



- $p_0 = 300, p_1 = 40, q_0 = 0, q_1 = 12000$
- $p_0 = 40, p_1 = 300, q_0 = 0, q_1 = 12000$
- $p_0 = 300, p_1 = 40, q_0 = 12000, q_1 = 0$
- $p_0 = 40, p_1 = 300, q_0 = 12000, q_1 = 0$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$p_0 = 300, p_1 = 40, q_0 = 0, q_1 = 12000$

7) At time t = 5s, what is the value of stress relaxation function? *1 point*

- 300 Pa
- 150 Pa
- 100 Pa
- 0 Pa

No, the answer is incorrect.
Score: 0
Accepted Answers:
0 Pa

8) What is the condition for deriving the expression for creep function, J(t)? *1 point*

- $\epsilon = 0$
- $\dot{\epsilon} = 0$
- $\sigma = 0$
- $\dot{\sigma} = 0$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\dot{\sigma} = 0$

9) The value of creep function at time t = 5s is? *1 point*

- 0.15
- 0.112
- 0.128
- 0.1

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.128

10) What is the response of strain at time t due to arbitrary stress history? (Here, *J(t)* is creep function). *1 point*

- $\epsilon(t) = J(t)\sigma(\dot{0}^+) + \int_{0^+}^{t} J(t-s)\sigma(s)ds$
- $\epsilon(t) = J(0^+)\sigma(t) + \int_{0^+}^{t} J(t-s)\dot{\sigma}(s)ds$
- $\epsilon(t) = J(t)\sigma(0^+) + \int_{0^+}^{t} J(t-s)\dot{\sigma}(s)ds$
- $\epsilon(t) = J(t)\sigma(0^+) + \int_{0^+}^{\infty} J(t-s)\dot{\sigma}(s)ds$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\epsilon(t) = J(t)\sigma(0^+) + \int_{0^+}^{t} J(t-s)\dot{\sigma}(s)ds$