

CHAPTER 10

1. Open-channel flows have a pressure force driving the fluid similar to pipe flows. True or False

A. True

B. False

2. Where did the greatest difference between high and low tide occur?

A. The Bay of Fundy, Canada

B. Lundy's Lane, Canada

C. The coast of Maine, U.S.A.

3. Open channel flow can have more than one characteristic. True or False

A. True

B. False

4. The surface of a lake or ocean is often distorted into changing patterns associated with _____.

A. Evaporation

B. Uniform flow

C. Surface waves

5. What effect on Lake Erie can result in deeper water in Buffalo Harbor and in the Niagara River?

A. Seychelles

B. Seiches

C. Sieves

6. The speed of a small amplitude, solitary wave is proportional to the _____ of the fluid depth.

YOUR ANSWER: Square root

7. The wave speed can be obtained from the continuity and energy equations. True or False

A. True

B. False

8. What does the term c represent in wave equations?

A. Wave depth

B. Wave speed

C. Amplitude

9. How is wave speed measured?

A. Relative to the flow

B. Relative to a fixed position on the ground

C. Relative to the acceleration of the wave

10. What assumption is made about the slope of the channel bottom in most open channel flows?

A. The surface is rough.

B. The slope is assumed to be constant.

C. The slope is assumed to be negative

11. According to the specific energy diagram, how many possible depths, with some physical meaning, are there for given flow rate and specific energy, assuming $E > E_{min}$?

A. One

B. Two

C. Three

12. The rate of change of the fluid depth depends on the local _____ of the channel bottom, the _____ of the energy line, and the Froude number.

YOUR ANSWER: Slope, slope

13. How is uniform depth flow achieved?

A. By adjusting the bottom slope to equal the slope of the energy line.

B. By adjusting the flow speed so that it equals the energy line

C. By ensuring uniform laminar flow

14. The wetted perimeter includes the free surface for open-channel flows. True or False

A. True

B. False

15. Where does the wall shear stress act in open-channel flow?

A. Along the entirety of the flow.

B. On the wetted perimeter.

C. Only on the free surface

16. The velocity profile in an open channel is uniform. True or False

A. True

B. False

17. Are most open-channel flows laminar or turbulent?

YOUR ANSWER: Turbulent

18. The Manning equation is used to obtain the ____ or flow rate in an open channel.

A. Flow rate

B. Density

C. Velocity

19. The value of the Manning coefficient, n , depends on what?

A. The nature of the channel surface

B. The mass flow rate of the flow

C. The type of fluid

20. What shape provides the best hydraulic cross section for open-channel flows?

A. A circular pipe

B. A semicircular channel

C. A triangular channel

21. What three classifications are open-channel flows divided into?

YOUR ANSWER: Uniform depth, gradually varying, rapidly varying.

22. How many different surface shape designations are there for free surface calculations?

YOUR ANSWER: 12

23. On what two factors does the free surface shape depend on?

YOUR ANSWER: the channel bottom slope and the Froude number

24. What is the technical term for a discontinuity in the free surface elevation of channel flow?

A. A hydraulic jump

B. A rectangular channel

C. Rapidly varied flow

25. What is the primary cause of the head loss that occurs across a hydraulic jump?

A. An increase in flow depth

B. Turbulent mixing

C. A change in momentum

26. What function of the upstream flow dictates the depth ratio across a hydraulic jump?

A. The mass flow rate

B. The velocity of the flow

C. The Froude number

27. The length of a hydraulic jump can be determined analytically. True or False

A. True

B. False

28. What are the two main mechanisms governing the flow over a weir?

YOUR ANSWER: Inertia and gravity

29. What happens to the velocity of the flow as it passes over a broad-crested weir?

A. It decelerates

B. Nothing

C. The flow accelerates and reaches critical condition.