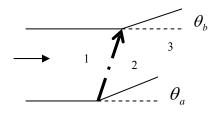
## **High-Speed Aerodynamics**

## **QUIZ**

- 1. What happens when an oblique shock or an acoustic wave hits a constant pressure boundary?
- 2. Why shock wave cannot form in an expanding flow?
- 3. Entropy changes in a flow produce vorticity illustrate with examples.
- 4. Shock-expansion theory predicts the lift force acting on an airfoil in supersonic flows without considering the Kutta condition. How is the Kutta condition satisfied?
- 5. How does camber affect the lift coefficient of an airfoil in supersonic flow?
- 6. An airfoil in inviscid subsonic flow does not experience any drag force but it does in inviscid supersonic flow why and how?
- 7. What is stagnation pressure?
- 8. A pitot tube does not measure the correct stagnation pressure in a supersonic stream. Why? How will you get the correct stagnation pressure from the pitot measurement?
- 9. What is thermal choking? What happens if heat is added to a thermally choked subsonic flow?
- 10. What causes the stagnation pressure loss in a gas turbine combustion chamber?
- 11. What are under- and over-expanded nozzle flows? What do you expect to happen in the jet that follows in each case?
- 12. What are the possible isentropic flows through a converging-diverging duct with fixed exit to throat area ratio connected to a fixed reservoir and back conditions?
- 13. Why do supersonic wind tunnels employ a second throat? How should the two throat areas compare?
- 14. How does a resistive force like friction accelerate a subsonic flow in ducts?
- 15. What is an unstarted intake diffuser?
- 16. Explain the phenomenon of 'buzz' in a supersonic intake.
- 17. If a plane acoustic wave of strength  $\Delta p$  is reflected from a closed end of a tube what will be the pressure there? If the end is open what will be the pressure then?
- 18. Consider the wave pattern shown in the sketch below.  $M_1$  is 1.8 and  $\theta_a$  is 3<sup>0</sup>. How much is  $\theta_b$ ?



- 19. What are characteristics? Method of characteristics cannot be employed to solve incompressible flow – why?
- 20. Shocks in transonic flow are usually normal shocks why?
  21. What are the different flow zones in a shock tube? Illustrate with a sketch. What are the differences between the central zones?
- 22. What are similarity rules? How do they differ from dimensional analysis?
- 23. Does perfect gas have a critical temperature? If yes, how much is it?
- 24. Consider the wave pattern shown below. Find  $\theta_1$  and  $\theta_2 \theta_1$ .

