CHAPTER 4: APPLICATION TO DIFFUSION AND CONVECTION-DIFFUSION PROBLEMS

CHAPTER OUTLINE

1. Methodology overview

2. Application of finite volume method to diffusion problems
   a. Problem description
   b. 1D steady state diffusion
   c. Example 1: one-dimensional conduction, temperatures prescribed at boundaries (handout 4.1)
   d. Example 2: one-dimensional conduction, temperature and heat flux prescribed at boundaries (handout 4.2)
   e. 2D steady state diffusion
   f. 3D steady state diffusion

3. Application of finite volume method to convection-diffusion problems
   a. Problem description
   b. 1D steady state convection-diffusion
   c. Central differencing scheme
   d. Example: Application of CDS (handout 4.3)
   e. Properties of discretization schemes (handout 4.4)
   f. Example: Assessment of CDS (handout 4.5)
   g. Upwind differencing scheme
   h. Example: Application of UDS (handout 4.6)
   i. Assessment of UDS
   j. Hybrid differencing scheme
   k. QUICK scheme
   l. Example: Application of QUICK (handout 4.7)
   m. Assessment of QUICK

4. Summary of discretization schemes (handout 4.8)

CHAPTER OBJECTIVES

- Apply the finite volume method to diffusion and convection-diffusion problems, using different algorithms