CHAPTER 14 BOUNDARY VALUE PROBLEMS

The subject of formulating and solving boundary value problems (BVP) is very large. In this chapter we demonstrate how to model and solve the boundary value formulation of any number of differential equations in one independent variable and possibly subject to algebraic constraints. In physical systems, the independent variable is typically time or distance. This chapter does not cover problems involving two or more independent variables.

We begin with a very simple ode and compare a number of numerical methods. We then investigate a nonlinear model of water in a tank. We shall see in the end that a single model of the physical system can be used for the initial value problem (IVP) as well as the BVP. This is a very important result because hard, algebraically constrained BVPs from engineering problems often cannot be solved without initialization from an approximate solution obtained with an IVP method.

14.1 BVP.A4L

A basic example is found in ascend4/models/plotbvp.a4s which shows how to define, solve, and plot a model. We will explain it in some detail here in the near future.

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