SHOOTING METHOD

od is called the *shooting method* because it resembles an roblem. In this method, the given boundary value problem is ted into an equivalent initial value problem and then solved of the methods discussed in the previous chapter. The approach Consider the equation

$$y'' = f(x, y, y') \quad y(a) = A, \quad y(b) = B$$

$y' = z$, we obtain the following set of two equations:

$$y' = z$$
$$z' = f(x, y, z)$$

to solve this set as an initial value problem, we need two at $x = a$. We have one condition $y(a) = A$ and, therefore, nother condition for z at $x = a$. Let us assume that $z(a) = M_1$, is a "guess". Note that M_1 represents the slope $y'(x)$ at $x = a$. problem is reduced to a system two first-order equations with 1 conditions

$$y' = z \qquad y(a) = A$$
$$z' = f(x, y, z) \qquad z(a) = M_1 (= y'(a))$$

(14.3)

(14.3) can be solved for y and z using any one-step method ps of h, until the solution at $x = b$ is reached. Let the estimated $y(x)$ at $x = b$ be B_1. If $B_1 = B$, then we have obtained the required In practice, it is very unlikely that our initial guess $z(a) = M_1$ is.

$\neq B$, then we obtain the solution with another guess, say $z(a) =$ the new estimate of $y(x)$ at $x = b$ be B_2 (see Fig. 14.1). If B_2 is al to B, then the process may be continued until we obtain the estimate of $y(b)$. However, the procedure can be accelerated by n improved guess for $z(a)$ after the estimates of B_1 and B_2 are d.