

Forward Difference Method

Theory:

The Forward Difference Method is used to approximate the derivative of a function at a point using the function value at that point and the next forward point. This method is particularly suitable when the point of differentiation lies near the beginning of the data table.

If the function values are given at equally spaced points with spacing h , the first derivative using the forward difference formula is approximated as:

$$\left(\frac{dy}{dx}\right)_x \approx \frac{y(x + h) - y(x)}{h}$$

In finite difference notation, this can be written as:

$$\frac{dy}{dx} \approx \frac{\Delta y_0}{h}$$

where Δy_0 represents the forward difference.

The forward difference method provides a simple and direct approximation of the derivative. However, because it uses only forward data points, the accuracy decreases if the function exhibits rapid variation. When compared to central difference methods (not included here), the forward difference method is less accurate but computationally simpler and suitable for boundary points.