Implicit Extrapolation Methods

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1 Work Calculations

1.1 Hairer Wanner Adaptivity

Using default work values for this solver,

$$A[1] = 5 + 2(N[1] + 1) + 1, N[1] = 1$$

$$\therefore A[1] = 10$$

$$A[J] = A[J-1] + 2(4N[J] - 1) + 1$$

$$A[J] = A[J-1] + 8N[J] - 1$$

Summing over the both sides,

$$A[N] = A[1] + 8\sum_{J=2}^{N}(N[J]) - \sum_{J=2}^{N} 1$$

$$A[N] = A[1] + 8\sum_{J=1}^{N}(N[J]) - 8N[1] - N + 1$$

$$A[N] = 10 + 8\sum_{J=1}^{N}(N[J]) - 8 - N + 1$$

$$\boxed{A[N] = 8\sum_{J=1}^{N}(N[J]) - N + 3}$$

1.2 Deuflhard Adaptivity

Using default work values for this solver,

$$A[1] = N[1] + 1 + NJAC, N[1] = 1, NJAC = NxNJacobian$$

$$A[1] = 2 + NJAC$$

$$A[J] = A[J-1] + 4N[J] - 1$$

Summing over the both sides,

$$A[N] = A[1] + 4\sum_{J=2}^{N}(N[J]) - \sum_{J=2}^{N} 1$$

$$A[N] = A[1] + 4\sum_{J=1}^{N}(N[J]) - 4N[1] - N + 1$$

$$A[N] = 2 + NJAC + 4\sum_{J=1}^{N}(N[J]) - 4 - N + 1$$

$$\boxed{A[N] = 4\sum_{J=1}^{N}(N[J]) - N - 1 + NJAC}$$

1.3 Explicit Methods

$$A[1] = N[1] + 1, N[1] = 1$$

$$A[1] = 2$$

$$A[J] = A[J-1] + seqr * N[J] - 1$$

Summing over the both sides,

$$A[N] = A[1] + seq\sum_{J=2}^{N}(N[J]) - \sum_{J=2}^{N} 1$$

$$A[N] = A[1] + seq\sum_{J=1}^{N}(N[J]) - seqN[1] - N + 1$$

$$A[N] = 2 + seq\sum_{J=1}^{N}(N[J]) - seq - N + 1$$

$$\boxed{A[N] = seq\sum_{J=1}^{N}(N[J]) - N + 3 - seq}$$