Appendix Spline Interpolation

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November 26, 2023

1 Item 1

$$3h_i^2 \cdot \frac{b_{i+1} - b_i}{3h_i} + 2b_i h_i + \frac{\eta_i}{h_i} - \frac{1}{3}h_i(b_{i+1} + 2b_i) = \frac{\eta_{i+1}}{h_{i+1}} - \frac{1}{3}h_{i+1}(b_{i+2} + 2b_{i+1})$$

$$h_i b_{i+1} - h_i b_i + 2b_i h_i + \frac{\eta_i}{h_i} - \frac{1}{3}h_i b_{i+1} - \frac{2}{3}h_i b_i = \frac{\eta_{i+1}}{h_{i+1}} - \frac{1}{3}h_{i+1}(b_{i+2} + 2b_{i+1})$$

$$h_i b_{i+1} + h_i b_i + \frac{\eta_i}{h_i} - \frac{1}{3}h_i b_{i+1} - \frac{2}{3}h_i b_i = \frac{\eta_{i+1}}{h_{i+1}} - \frac{1}{3}h_{i+1}(b_{i+2} + 2b_{i+1})$$

$$h_i b_{i+1} + \frac{1}{3}h_i b_i + \frac{\eta_i}{h_i} - \frac{1}{3}h_i b_{i+1} = \frac{\eta_{i+1}}{h_{i+1}} - \frac{1}{3}h_{i+1}(b_{i+2} + 2b_{i+1})$$

$$\frac{2}{3}h_i b_{i+1} + \frac{1}{3}h_i b_i + \frac{\eta_i}{h_i} = \frac{\eta_{i+1}}{h_{i+1}} - \frac{1}{3}h_{i+1}(b_{i+2} + 2b_{i+1})$$

$$\frac{2}{3}h_i b_{i+1} + \frac{1}{3}h_i b_i + \frac{\eta_i}{h_i} = \frac{\eta_{i+1}}{h_{i+1}} - \frac{1}{3}h_{i+1}b_{i+2} - \frac{2}{3}b_{i+1}h_{i+1}$$

$$\frac{2}{3}h_i b_{i+1} + \frac{1}{3}h_i b_i + \frac{\eta_i}{h_i} + \frac{1}{3}h_{i+1}b_{i+2} + \frac{2}{3}b_{i+1}h_{i+1} = \frac{\eta_{i+1}}{h_{i+1}}$$

$$\frac{2}{3}(h_i + h_{i+1})b_{i+1} + \frac{1}{3}h_i b_i + \frac{1}{3}h_{i+1}b_{i+2} = \frac{\eta_{i+1}}{h_{i+1}} - \frac{\eta_i}{h_i}$$

2 Consulted Sources

all webpages were used November 25, 2023 12:00pm

1. https://docs.scipy.org/doc/scipy/reference/generated/scipy.interpolate.CubicSpline.html#scipy.interpolate.CubicSpline
2. https://study.com/academy/lesson/oscillation-definition-theory-equation.html
3. https://mathepedia.de/Runges_Phaenomen.html
4. https://www.math.hkust.edu.hk/ machas/numerical-methods-for-engineers.pdf (sections 44,45)
5. https://web.stanford.edu/class/math114/lecture_notes/splines.pdf
6. https://core.ac.uk/download/pdf/82673801.pdf