4.3 Eigen-Analysis of Spectral Derivative Matrices

Fig. 4.8. Chebyshev collocation first-derivative eigenvalues computed with 64-bit precision. Results contaminated by round-off error are indicated.

Fig. 4.9. ε-pseudospectra, $A_\varepsilon$, of Chebyshev collocation first-derivative matrix. $A_\varepsilon$ is plotted for $\varepsilon = 10^{-4}, 10^{-3.5}, \ldots, 10^0$ for $N = 16$ (left) and for $\varepsilon = 10^{-8}, 10^{-7}, \ldots, 10^0$ for $N = 32$ (right). The innermost isoline corresponds to the minimum value of $\log_{10} \varepsilon$, the outermost to the maximum value of $\log_{10} \varepsilon$. These are $-4$ and $0$ in the left-hand figure, and $-8$ and $0$ in the right-hand figure.
Fig. 4.10. Legendre collocation first-derivative eigenvalues computed with 64-bit precision. Results contaminated by round-off error are indicated.

Fig. 4.11. $\epsilon$-pseudospectra, $A_\epsilon$, of Legendre collocation first-derivative matrix. $A_\epsilon$ is plotted for $\epsilon = 10^{-5}, 10^{-4.5}, \ldots, 10^{0}$ for both $N = 16$ (left) and $N = 32$ (right). The range of the isoline values are $[-5, 0]$ for both figures.