# The use of Cramer's Rule to compute Jordan blocks

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1 Examples

# Outline

1 Examples

# Example 1

Brusselator matrix `bwm200.mtx`

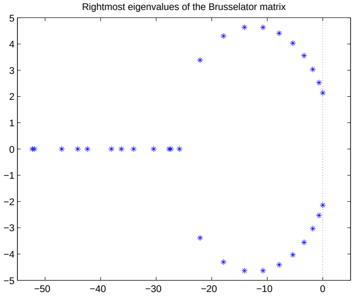


Figure: Rightmost eigenvalues of the Brusselator matrix in Example 1.

# Example 1

Table: Results for Example 1.

| | Newton method | |
|---|---|---|
| $i$ | $\omega^{(i)}$ | $\sigma^{(i)}$ |
| 0 | 2.139497522076343 | 0 |
| 1 | 2.139500605660196 | 0.000003945783288 |
| 2 | 2.139498347974815 | 0.000007501155960 |
| 3 | 2.139497555283851 | 0.000008232779535 |
| 4 | 2.139497522029795 | 0.000008240958244 |
| 5 | 2.139497522014711 | 0.000008240971717 |
| 6 | 2.139497522014712 | 0.000008240971698 |
| 7 | 2.139497522014729 | 0.000008240971700 |

# Example 2

Orr-Sommerfeld operator

$$\frac{1}{\gamma R} L^2 v - i(UL - U'')v = \lambda L v, \quad \text{where} \quad L = \frac{d^2}{dx^2} - \gamma^2 \quad \text{and} \quad U = 1 - x^2.$$

Discretise the operator on $v \in [-1, 1]$ using finite differences with $\gamma = 1$, $R = 1000$ and $n = 1000$.

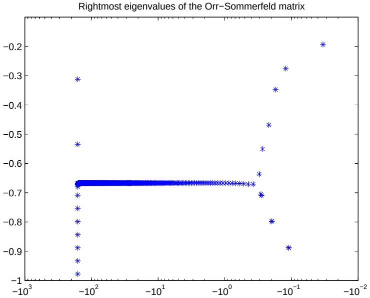


Figure: Eigenvalues of the Orr-Sommerfeld matrix in Example 2.

# Example 2

Table: Results for Example 2.

| | Newton method | |
|---|---|---|
| $i$ | $\omega^{(i)}$ | $\sigma^{(i)}$ |
| 0 | $\underline{0.19}3436725409075$ | 0 |
| 1 | $\underline{0.}218800823846808$ | $\underline{0.001}167840541822$ |
| 2 | $\underline{0.19}7802937240606$ | $\underline{0.001}677701319949$ |
| 3 | $\underline{0.199}234021015488$ | $\underline{0.0019}67966799522$ |
| 4 | $\underline{0.19975}0160624809$ | $\underline{0.00197}7969720963$ |
| 5 | $\underline{0.19975599}8455533$ | $\underline{0.0019781722}55527$ |
| 6 | $\underline{0.1997559994471}47$ | $\underline{0.001978172281960}$ |