

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`

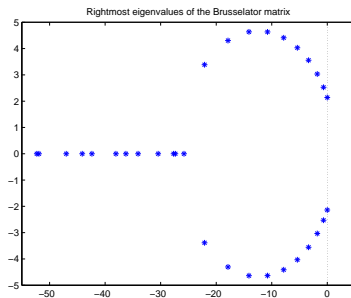


Figure: Rightmost eigenvalues of the Brusselator matrix in Example 1.

Example 1

Table: Results for Example 1.

NEWTON METHOD		
i	$\omega^{(i)}$	$\sigma^{(i)}$
0	<u>2.139497522076343</u>	0
1	<u>2.139500605660196</u>	<u>0.000003945783288</u>
2	<u>2.139498347974815</u>	<u>0.000007501155960</u>
3	<u>2.139497555283851</u>	<u>0.000008232779535</u>
4	<u>2.139497522029795</u>	<u>0.000008240958244</u>
5	<u>2.139497522014711</u>	<u>0.000008240971717</u>
6	<u>2.139497522014712</u>	<u>0.000008240971698</u>
7	<u>2.139497522014729</u>	<u>0.000008240971700</u>

Example 2

Orr-Sommerfeld operator

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

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

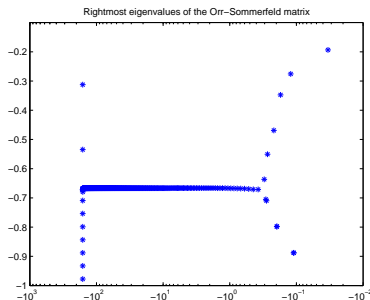


Figure: Eigenvalues of the Orr-Sommerfeld matrix in Example 2.

Example 2

Table: Results for Example 2.

NEWTON METHOD		
i	$\omega^{(i)}$	$\sigma^{(i)}$
0	<u>0.193436725409075</u>	0
1	<u>0.218800823846808</u>	<u>0.001167840541822</u>
2	<u>0.197802937240606</u>	<u>0.001677701319949</u>
3	<u>0.199234021015488</u>	<u>0.001967966799522</u>
4	<u>0.199750160624809</u>	<u>0.001977969720963</u>
5	<u>0.199755998455533</u>	<u>0.001978172255527</u>
6	<u>0.199755999447147</u>	<u>0.001978172281960</u>