(0MN) model

|  |  |  |
| --- | --- | --- |
|  |  | () |
|  |  |  |
|  |  | () |
|  |  |  |
|  |  | () |
|  |  |  |
|  |  | () |
|  |  |  |
|  |  | () |

Steady state:

|  |  |  |
| --- | --- | --- |
|  |  | () |
|  |  |  |

The Jacobian of Eqs. (1)-(4) is

|  |  |  |
| --- | --- | --- |
|  |  | () |
|  |  |  |

The eigenvalues of the Jacobian satisfy the characteristic equation:



|  |  |  |
| --- | --- | --- |
|  |  | () |

Eq. (8) can be expanded to



|  |  |  |
| --- | --- | --- |
|  |  |  |

|  |  |  |
| --- | --- | --- |
|  |  | () |

Take the derivative of Eq. (5) yields

|  |  |  |
| --- | --- | --- |
|  |  | () |

