

$$\begin{aligned}
|\mathbf{I} + \epsilon \mathbf{M}| &= \begin{vmatrix}
1 + \epsilon M_{11} & \epsilon M_{21} & \epsilon M_{31} & \epsilon M_{41} & \epsilon M_{51} \\
\epsilon M_{12} & 1 + \epsilon M_{22} & \epsilon M_{32} & \epsilon M_{42} & \epsilon M_{52} \\
\epsilon M_{13} & \epsilon M_{23} & 1 + \epsilon M_{33} & \epsilon M_{43} & \epsilon M_{53} \\
\epsilon M_{14} & \epsilon M_{24} & \epsilon M_{34} & 1 + \epsilon M_{44} & \epsilon M_{54} \\
\epsilon M_{15} & \epsilon M_{25} & \epsilon M_{35} & \epsilon M_{45} & 1 + \epsilon M_{55}
\end{vmatrix} \\
&= (1 + \epsilon \sum_i M_{ii}) + O(\epsilon^2)
\end{aligned}$$