Mathematical Methods for ME

University Mechanical Engineering · Vocabulary in context

Word	Example
mathematical methods /ˌmæθɪˈmætɪkl ˈmeθədz/	Use **mathematical methods** to solve equations describing a circuit.
derivative /dɪˈrɪvətɪv/	Use the **derivative** to find the curve's slope at this point.
definite integral /ˈdefɪnət ˈɪntɪgrəl/	A **definite integral** has limits and gives a number, such as an area.
displacement /dɪˈspleɪsmənt/	After walking 3 km east, your **displacement** is 3 km east. 3 km 3 km
volume of revolution /ˈvɒljuːm ɒv ˌrevəˈluːʃn/	Find the **volume of revolution** by rotating this region about an axis.
eigenvalue /ˈaɪgənvæljuː/	**Eigenvalue**s of A determine the modes of a linear state model. A
eigenvector /ˈaɪgənvektə/	The matrix scales an **eigenvector** without changing its line.
condition number	A large **condition number** warns that small input errors may matter.
basis /ˈbeɪsɪs/	A **basis** is a set of vectors that can build every vector in the space.
natural frequency /ˈnætʃərəl ˈfriːkwənsi/	A swing has its own **natural frequency**.
damping ratio	A **damping ratio** of 1 gives critical damping. 1

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damped frequency	An underdamped system oscillates at its **damped frequency**.
resonance /ˈrezənəns/	**Resonance** makes the swing go very high.
magnification factor	The **magnification factor** compares vibration amplitude with static displacement.
truncation error	Using a finite approximation introduces **truncation error**.
round-off error	Storing one third with limited digits introduces **round-off error**.
gradient /ˈgreɪdɪənt/	An electrostatic field points opposite to the potential **gradient**.
divergence /daɪˈvɜːdʒəns/	Positive **divergence** means more field flows out than in.
curl /kɜːl/	Zero **curl** means no local circulation in the field.
flux /flʌks/	**Flux** measures how much of a field passes through a surface.
divergence theorem	The **divergence theorem** links the flux through a closed surface to the divergence inside.
uncertainty /ʌnˈsɜːtənti/	The length is 25.0 cm with an **uncertainty** of 0.1 cm. 25.0 cm 0.1 cm
expanded uncertainty	Multiply combined standard uncertainty by a coverage factor for **expanded uncertainty**.
confidence interval /ˈkɒnfɪdəns ˈɪntəvl/	A narrow **confidence interval** means the estimate is precise.

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propagation of uncertainty	Use **propagation of uncertainty** to estimate uncertainty in the calculated area.
characteristic equation /ˌkærɪktəˈrɪstɪk ɪˈkweɪʒn/	The roots of the **characteristic equation** show how the system behaves.
underdamped	**Underdamped** responses ring at the damped frequency.
Euler method	Use the **Euler method** to estimate the next position.
trapezoidal rule /ˈtræpɪzɔɪdl ruːl/	The **trapezoidal rule** estimates area using straight-sided strips.
Simpson's rule	Use **Simpson's rule** with an even number of equal-width intervals.
Type A uncertainty	**Type A uncertainty** is worked out from the spread of repeated readings.

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