Mathematical Methods for EE

University Electrical 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.
integral /ˈɪntɪgrəl/	Use an **integral** to find the charge in a pulse.
rectangular pulse /rekˈtæŋgjʊlə pʌls/	A **rectangular pulse** stays at one height for a set time.
complex number /ˈkɒmpleks ˈnʌmbə/	The **complex number** 4 + 3j has a real part of 4. 4 + 3j 4
modulus /ˈmɒdjʊləs/	The **modulus** of 4 + 3j is 5. 4 + 3j 5
argument /ˈɑːgjuːmənt/	A positive real complex number has **argument** zero.
euler's identity /ˈɔɪləz aɪˈdentɪti/	**Euler's identity** links complex exponentials to sine and cosine.
phasors	Use **phasors** to compare amplitude and phase at one frequency.
linear system /ˈlɪnɪə ˈsɪstəm/	Solve a **linear system** to find three node voltages.
matrix inverse /ˈmeɪtrɪks ɪnˈvɜːs/	Multiplying by the **matrix inverse** can undo multiplication by a matrix.
determinant /dɪˈtɜːmɪnənt/	A nonzero **determinant** means a square matrix has an inverse.

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singular /ˈsɪŋgjʊlə/	A **singular** matrix has no matrix inverse.
ordinary differential equations	Circuit switching equations are **ordinary differential equations**.
homogeneous /ˌhɒməˈdʒiːniəs/	The **homogeneous** solution solves the equation with zero input.
particular /pəˈtɪkjʊlə/	A **particular** solution satisfies the equation with its given input.
initial condition /ɪˈnɪʃl kənˈdɪʃn/	The **initial condition** states the capacitor's starting voltage.
laplace transform	The **Laplace transform** turns a differential equation into simple algebra.
partial fractions /ˈpɑːʃl ˈfrækʃnz/	Use **partial fractions** to split $1/[s(s+1)]$ into $1/s$ minus $1/(s+1)$. $1/[s(s+1)] \quad 1/s \quad 1/(s+1)$
poles /pəʊlz/	Simple **poles** at 0 and -2 give constant and decaying terms. 0 -2
fundamental /ˌfʌndəˈmentl/	Compare the **fundamental** with harmonics at multiples of its frequency.
fourier series /ˈfɔːrɪə ˈsɪəriːz/	A **Fourier series** describes a square wave using sinusoidal harmonics.
orthogonality /ˌɔːθɒgəˈnælɪti/	**Orthogonality** means two different sine waves average to zero when multiplied.
harmonic /hɑːˈmɒnɪk/	The second **harmonic** has twice the frequency of the first.

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random variable /ˈrændəm ˈveərɪəbl/	The measured noise voltage is a **random variable**.
probability distribution /ˌprɒbəˈbɪlɪti ˌdɪstrɪˈbjuːʃn/	A **probability distribution** describes how likely different noise values are.
expectation /ekspɪkˈteɪʃn/	The **expectation** of a fair die's score is 3.5. 3.5
variance /ˈveərɪəns/	The **variance** is the square of the standard deviation.
standard deviation /ˈstændəd ˌdiːvɪˈeɪʃn/	A larger **standard deviation** means the values are more spread out.
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.

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