Heat Transfer

University Mechanical Engineering · Vocabulary in context

Word	Example
heat transfer	**Heat transfer** finds how fast heat moves, not only how much.
Fourier's law	**Fourier's law** links heat flux to the temperature gradient.
thermal conductivity /ˈθɜːml kɒndəkˈtɪvɪti/	Mineral wool has a **thermal conductivity** of about 0.04 W/(m · K). 0.04 W/(m · K)
thermal resistance /ˈθɜːml rɪˈzɪstəns/	Each layer of the wall adds a **thermal resistance** in series.
critical radius	Above the **critical radius**, more insulation always reduces the loss.
Biot number	Check the **Biot number** before using the lumped model.
lumped capacitance	The small ball cools by **lumped capacitance**, one temperature inside.
Fourier number	The **Fourier number** measures how far heat has soaked into the body.
thermal boundary layer	A thinner **thermal boundary layer** gives a larger h. h
Nusselt number	The **Nusselt number** is h made dimensionless. h
Prandtl number	Air has a **Prandtl number** of about 0.71. 0.71
emissivity /ɪmɪˈsɪvɪti/	A black surface has an **emissivity** close to 1. 1

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view factor	The **view factor** is the share of radiation that reaches the other surface.
grey surfaces	For **grey surfaces**, emissivity does not depend on wavelength.
radiosity	The **radiosity** is everything leaving a surface: emitted plus reflected.
plate heat exchanger	The loop rejects its heat through a **plate heat exchanger**.
overall heat transfer coefficient	Fouling lowers the **overall heat transfer coefficient**.
log mean temperature difference	Size the exchanger with the **log mean temperature difference**.
counterflow	**Counterflow** needs the least area for a given duty.
parallel flow	In **parallel flow** the outlet temperatures cannot cross.
effectiveness–NTU method	Use the **effectiveness–NTU method** when the outlets are unknown.
effectiveness /ɪˈfektɪvnəs/	The clean exchanger has an **effectiveness** of 0.51. $$0.51$$
fouling resistance	Add a **fouling resistance** for a year of scale.
fins /fɪnz/	Aluminium **fins** add area to the heat sink.
fin efficiency	A **fin efficiency** of 0.95 means the fin is nearly at base temperature. $$0.95$$

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