

Advanced Heat and Mass Transfer

Summer semester

- ▶ Lecture: 2 SWS, Prof. Dr.-Ing. E. Specht
- ▶ Seminar: 2 SWS, Dr.-Ing. Ashok Nallathambi, JProf. Dr.-Ing. Fabian Herz
- ▶ LSF entry of this lecture

Chemical and Energy Engineering

Advanced Heat and Mass Transfer

The students are able to calculate the heating and cooling time of solids such as metals, ceramics and fuels. They know the mechanism of radiative heat transfer. They know how they can influence the heat transfer by shields and secondary walls. They can apply the processes for intensive quenching using liquids. They can calculate coupled heat and mass transfer processes using equilibrium conditions. Therewith, they are able to design thermally processes for high temperature and energy process engineering.

- ▶ Mechanisms of heat transfer: fundamental equations for convection and radiation approximate values for heat transfer coefficients
- ▶ Stationary heat conduction: heat flux through walls (panes, cylinders, spheres), impact of insulation layers and fins, heat loss by convection and radiation
- ▶ Radiative heat transfer: mechanism, emissivities, view factors, heat transfer between solids, heat transfer between gases and solids, radiation shields, green house effect
- ▶ Quenching of metals, Leidenfrost problem, heat transfer of sprays, jets and films
- ▶ Transient heat conduction, approximate solution of Fourier's differential equation for convective and radiative heat transfer, Newton's capacity model, semi-infinite bodies
- ▶ Melting and freezing processes

Lectures with examples and excursions

Thermodynamics, Fluidmechanics, Mathematics, Physics, convective heat transfer

- ▶ 4 SWS
- ▶ Time of attendance: 56 h
- ▶ Autonomous work: 94 h

Written exam 120 min, 5 CP

Prof. Dr.-Ing. E. Specht

- ▶ handsout for download,
- ▶ Mills: Basic Heat and Mass Transfer

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