Hochschule Bremen
City University of Applied Sciences

Atmospheric re-entry

Guided Work (4)

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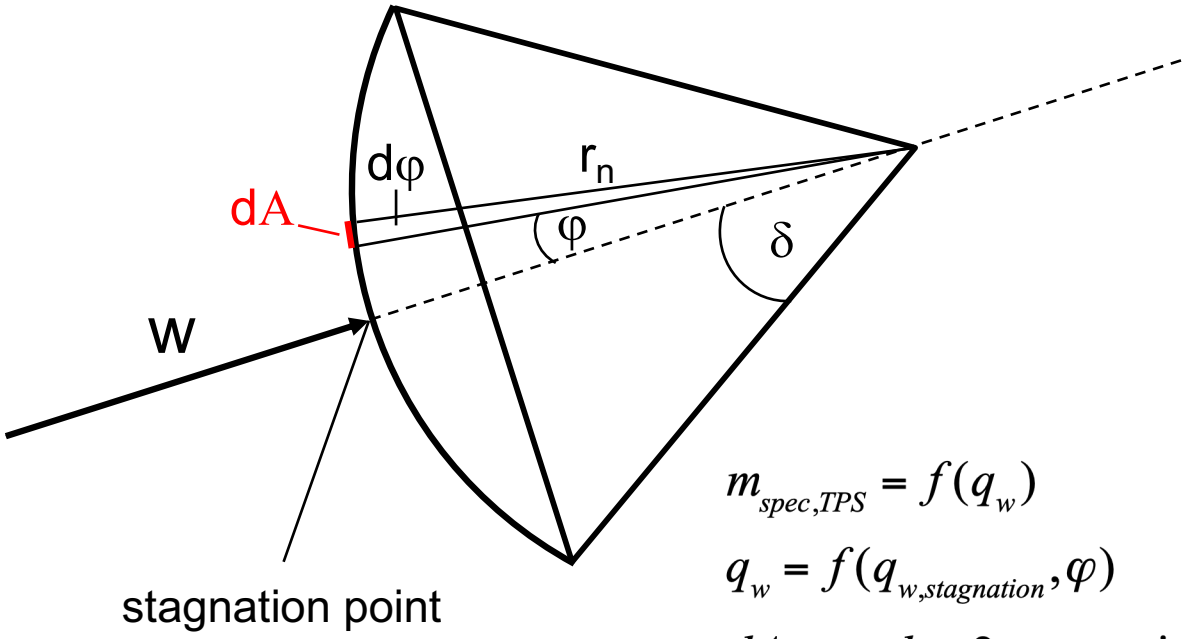
Task

- Select a thermal protection material depending on the maximum heat flux and integrated heat flux you have calculated
- Calculate the mass of the TPS for your vehicle taking into account the variation of specific mass of shield over the vehicle geometry as a function of integrated heat flux variation

- Due Date for delivery of your project results is June 2nd . The deliverable is a report on your re-entry project describing the selected mission, your assumptions, your approach, the results of your trajectory simulation, your heat flux calculation and TPS mass calculation
- The computer code used for your calculations has to be uploaded together with report
- Please do not forget to put the full names and IPSA student ID numbers on your report

Calculation of the mass of the thermal protection system



$$m_{spec,TPS} = f(q_w)$$

$$q_w = f(q_{w,stagnation}, \varphi)$$

$$dA = r_n \cdot d\varphi \cdot 2 \cdot \pi \cdot r_n \cdot \sin(\varphi)$$

$$dm_{TPS} = m_{spec,TPS}(\varphi) \cdot dA$$

$$m_{TPS} = \int_A dm_{TPS} = r_n^2 \cdot 2 \cdot \pi \int_{\varphi=0}^{\varphi=\delta} m_{spec,TPS}(\varphi) \cdot \sin(\varphi) d\varphi$$