

# ERC - MultiMelt

## Melting & dissolution across scales in multicomponent systems

This assignment is to test your ability to do some basic image analysis, inventive and creative analysis, ability to handle large amounts of data, error analysis, some programming, test your knowledge of heat transfer, and basic physics derivations, and is directly related to the type of analysis involved in the PhD project. The experiment is on the natural convection of a melting ice sphere in a large water tank. The sphere is attached using a cylindrical horizontal rod. In this preliminary experiment we have taken images from the side, see Fig. 1.

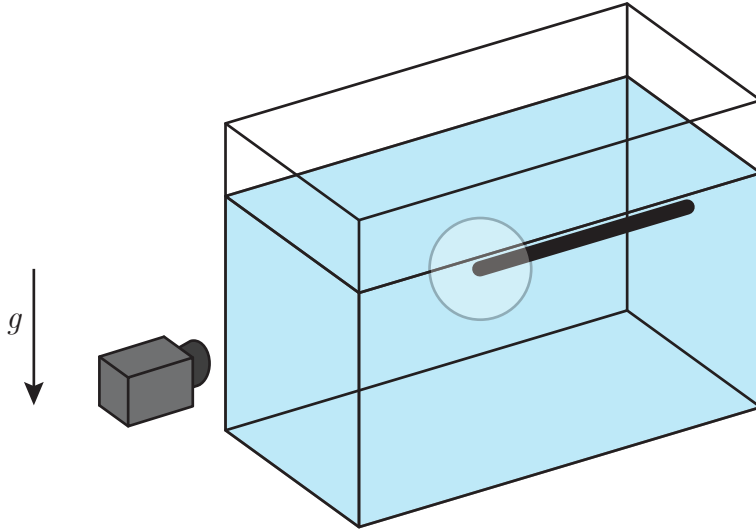


Figure 1: Ice sphere supported horizontally and melting in a large tank with water. Camera (left) is positioned in the axial direction of the cylindrical support.

Natural questions that arise are: What is the volume over time (assuming rotational symmetry)? What is the heat flux and melting-rate for this object as a function of time and angle? And perhaps you have some questions yourself. Do the analysis and be creative in the way you show the final results in several figures and write a tiny report (L<sup>A</sup>T<sub>E</sub>X PDF) detailing your analysis, assumptions you made, and conclusions you have. These data might be useful for you:

- Initial tank temperature: 19.1 °C
- Initial ice temperature: -20 °C
- Initial radius sphere:  $\approx 60$  mm
- Supporting rod diameter: 15.0 mm
- Liquid/solid: water

Details of the camera, timing, and optics can be found in the EXIF information of the images.