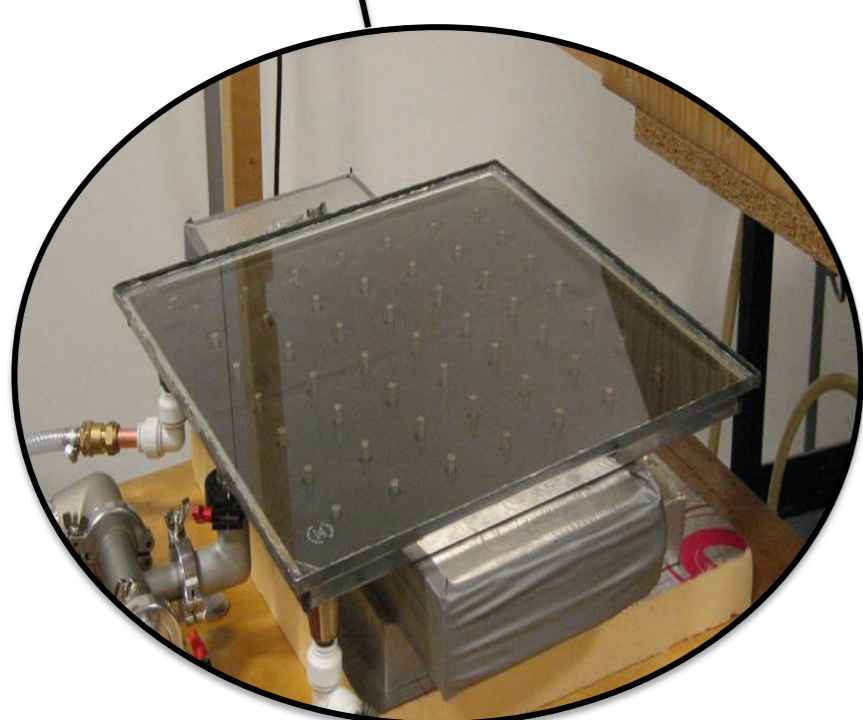


Solar Collector Development

The Solar Collector Lab is used for research into the development of novel solar collector technology. One current project is developing a vacuum insulated flat plate solar thermal collector.



Solar collector testing

The domestic average heat requirement in the UK is nearly four times the electricity usage. At some times of year, this heat can be provided by solar thermal panels: this is more efficient than using PV panels to generate electricity to, for instance, run an immersion heater.

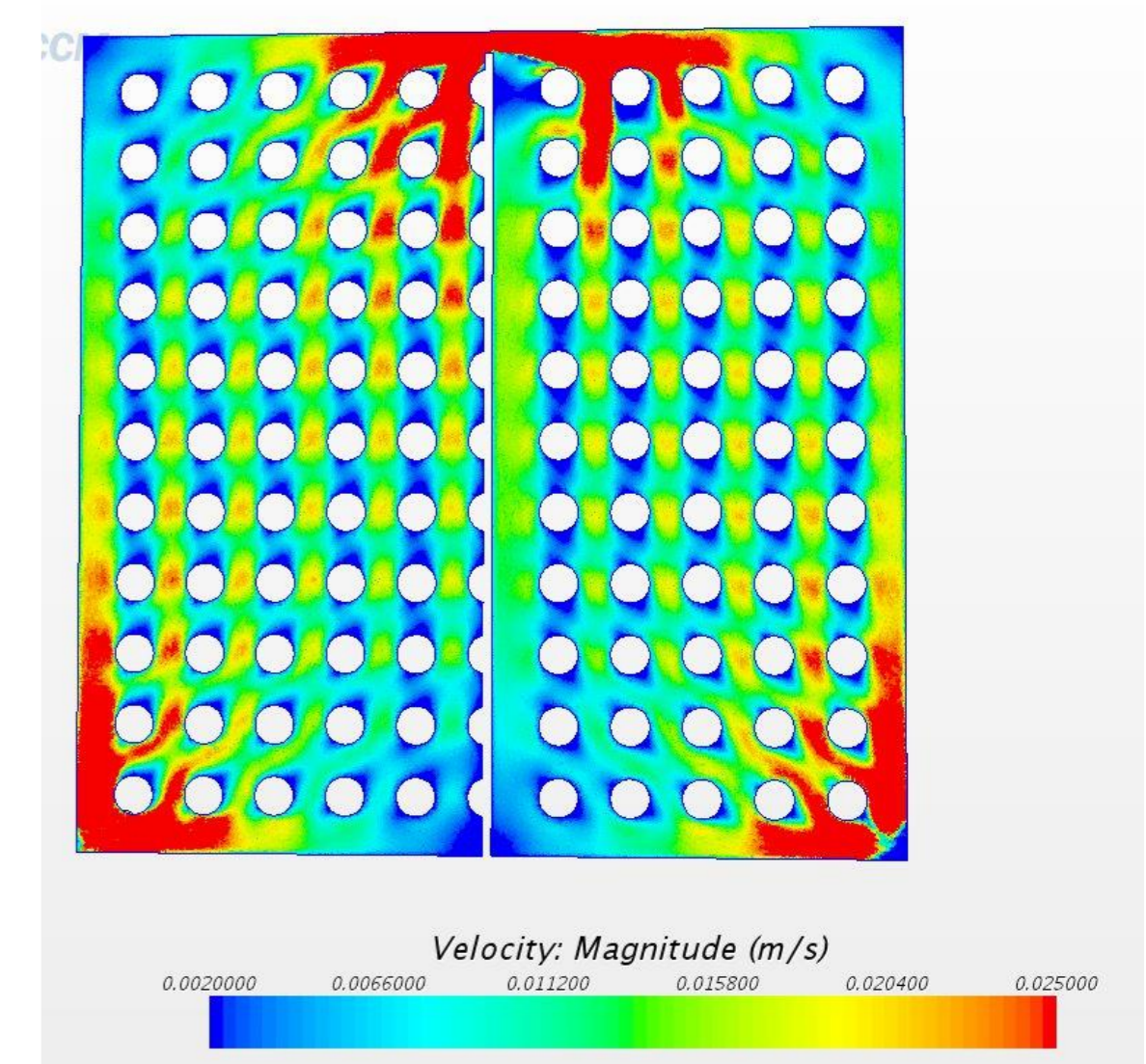
Thermal solar panels become increasingly inefficient as the water temperature rises or in cold weather because heat is lost from the absorber to the surroundings via the cover glass.

This loss can be drastically reduced by having a vacuum between collector and cover glass, as in a thermos flask – in fact once conduction losses are eliminated, the solar panel can generate high temperatures (150°C) and could be used to provide process heat for industrial processes too.

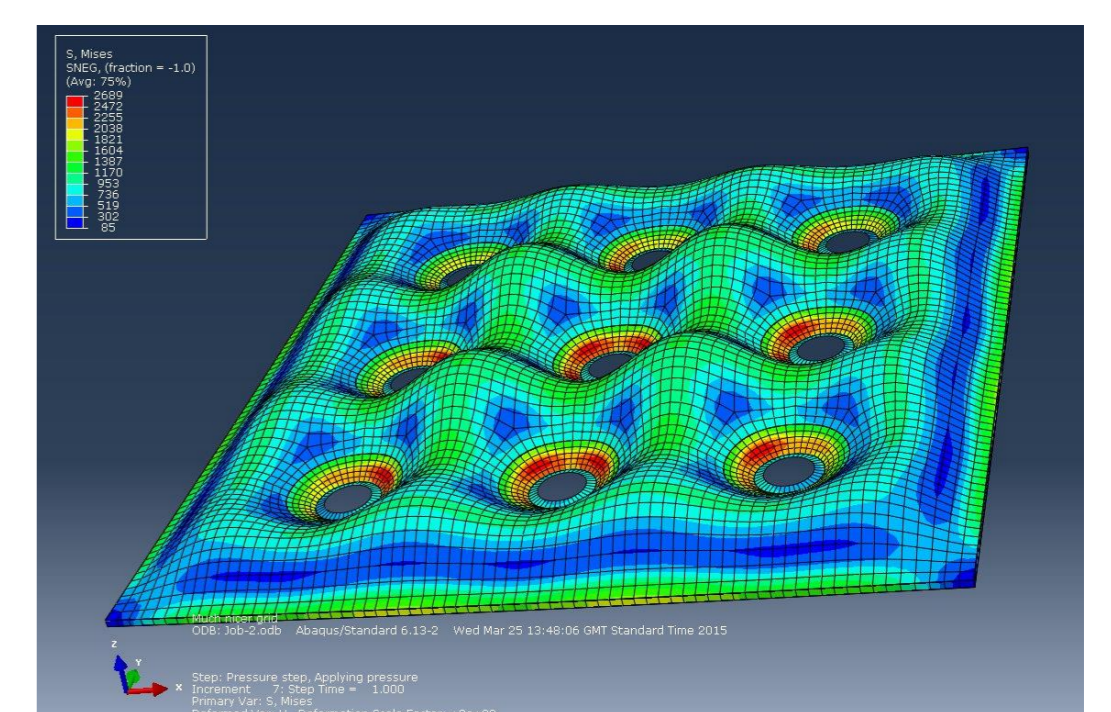
Vacuum technology is already used in evacuated tube collectors but flat panels can provide a larger area to collect heat, are more attractive and, unlike focusing systems, can generate high temperatures even in cloudy conditions.

This EPSRC-funded project aims to demonstrate the advantages and viability of these vacuum-insulated thermal collectors.

A number of designs are under evaluation. One unusual feature is that, to prevent the cover glass from bowing inwards under air pressure, an array of support pins has to pass through holes in the absorber. This raises a variety of challenges in terms of manufacturing, flow distribution and stress concentrations.



Flow through the absorber



Absorber deformation in vacuum

