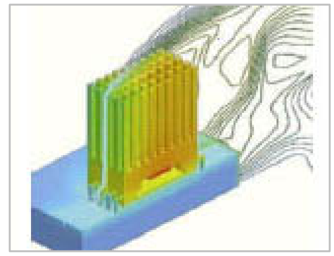


CAESIM includes advanced capabilities for modeling convective, radiative, and conjugate heat transfer. When heat transfer is activated, **CAESIM** solves the energy conservation equation.

$$\frac{\partial \rho H}{\partial t} + \frac{\partial(\rho u_i H)}{\partial x_i} = \frac{\partial}{\partial x_i}\left[\frac{\kappa}{C_p}\frac{\partial H}{\partial x_i}\right] + \frac{\partial p}{\partial t} + u_i \frac{\partial p}{\partial x_i} + \Phi + Q + S_{H,p}$$

Conjugate Heat Transfer

In many flow problems, there are solid objects within the computational domain. Though fluid cannot penetrate the solid-fluid interface, heat can be transferred through the interface and conducted inside the solid objects. In this circumstance, mass and momentum equations are solved in the fluid side only, but the energy equation is applied to both the fluid and solid regions. Because the solid-fluid interface requires attention to ensure appropriate conservation of energy, conjugate heat transfer analysis was developed. Basically, at the solid-fluid interface the following two conditions need to be met. The two conditions state that the heat flux and temperature across the fluid-solid interface are continuous. In general, the fluid and solid objects have different specific heats $C_{p,f}$ and $C_{p,s}$. Therefore, enthalpy across the interface is not generally continuous.

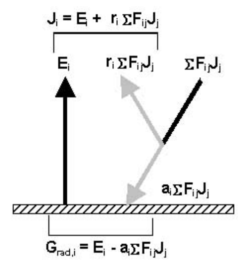
$$k_f \left.\frac{\partial T_f}{\partial n}\right|_i = k_s \left.\frac{\partial T_s}{\partial n}\right|_i$$

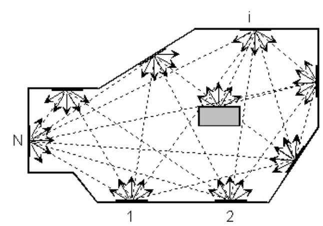
$$T_f\big|_i = T_s\big|_i$$

Radiative Heat Transfer

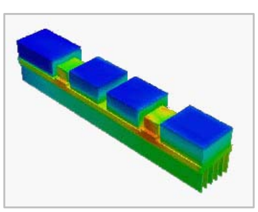
The view factor radiation model is well suited for any application in which the thermal contrasts within your flow domain are large enough to warrant the inclusion of radiative heating as an important form of internal energy transfer. It can be used alone or in combination with the **CAESIM** conjugate heat transfer model to investigate a number of classes of problems, including

- Evaluation of heating, air conditioning, and ventilation systems in residences, auditoriums, or other commercial or public buildings.
- Computation of the airflow and temperatures in furnaces, ovens, or similar heated chambers.
- Evaluation of insulation schemes for heated (or cooled) pipes, ducts, or structural components (e.g., walls).
- Heat exchanger design for power production, waste heat recovery, and chemical processing applications.
- Heat sensor element design analyses.

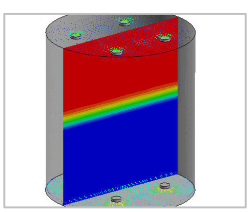




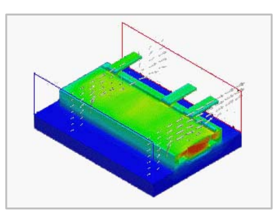
CAESIM Example Applications



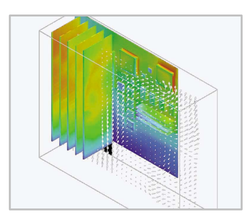
Diode



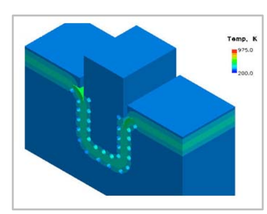
Chill Tank



Mag Assembly



Computer Board



Tool Die