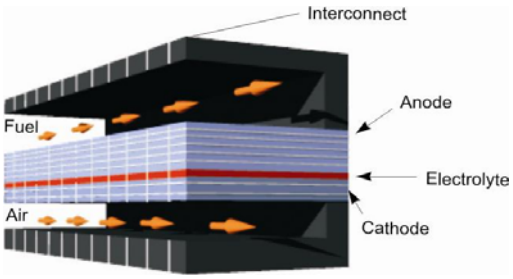
DETCHEM^{SOFC}

The Solid-Oxide Fuel Cell (SOFC) model in DETCHEM is a quasi two dimensional code for simulating the behavior of planar and tubular unit cells under co-flow configuration. The model also supports button cell simulations. The following lists the features of DETCHEM^{SOFC},

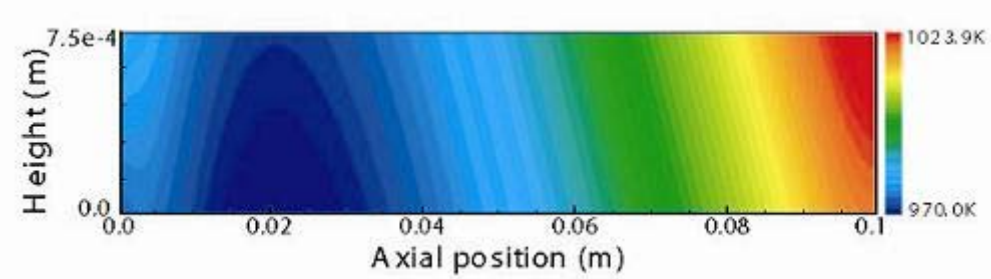
- Model support for planar, tubular, and button cell configuration
- Chemistry within the anode can be implemented as elementary kinetics or as global kinetics
- Porous media transport is described by Dusty-Gas-Model (DGM). However, mixed diffusion is also supported.
- Support for elementary charge transfer kinetics.

The code works based on a text driven input file, where the user specifies the inlet and reaction conditions for the unit cell. The model generates a number of output data, such as the change of various properties in the fuel and air channel; density, temperature, and composition within the electrodes; local electrochemical variables such as current density, activation losses, Nernst potential, and charge transfer resistance. Further the code also generates average data such as fuel utilization, air utilization, efficiency, maximum stoichiometric current etc.

A schematic representation of a planar cell modeled using DETCHEM^{SOFC} and the temperature profile within the anode for direct internal reforming is shown below



A schematic representation of planar cell configuration



Temperature profile within the anode of the planar cell under direct internal reforming