

Computer Models For Fire and Smoke

Model Name: BISTRA

Version: 1

Date: 2006

Classification: Fire Endurance

Very Short Description: Thermal transient analysis in 2D free form objects.
Conduction: temperature dependent thermal conductivity and specific heat. Convection: temperature difference dependent heat transfer coefficient. Radiation: non-linear view factor based radiation.
Output highlight: animations of transient heat transfer.

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User's Guide: BISTRA manual.

Technical References: See User's Guide

Validation References: "Validation of BISTRA for calculating temperatures in fire exposed structures", 2006, Physibel, available on request: mail@physibel.be.

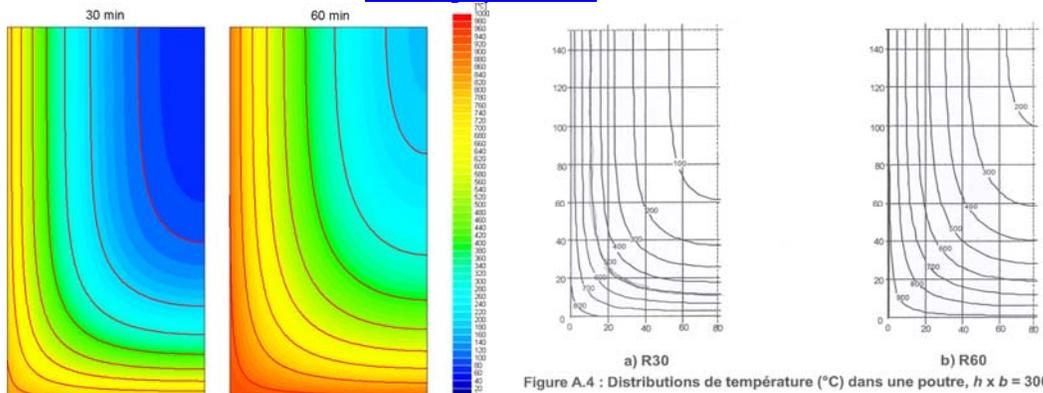


Figure A.4 : Distributions de température (°C) dans une poutre, $h \times b = 300 \times 160$

Availability: Physibel, Heirweg 21, B-9990 Maldegem, Belgium
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Price: 6 800 EUR
Educational prices on request.

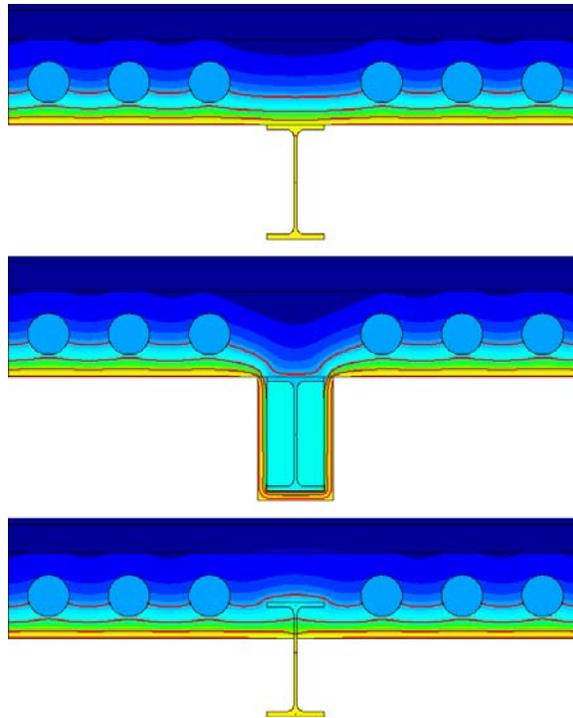
Necessary Hardware: A good P.C., MS Windows operating system.

Computer Language: C++

Size: BISTRA.EXE has 720 Kbyte.

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Detailed Description:



BISTRA is a thermal analysis program for transient heat transfer in two-dimensional free-form objects. BISTRA is an extension for time-dependent boundary conditions of the steady-state program BISCO. BISTRA can be used to carry out fire simulations. The RADCON module allows including the simulation of non-linear radiation based on geometric view factors. The thermal conductivity and specific heat of materials may be temperature dependent. Latent heat is modeled through an increase of specific heat within a

small temperature interval around the change of phase temperature.

The geometry is defined by a coloured picture in bitmap format. The tool BISCO-DXF allows converting DXF files into the appropriate bitmap format.

BISTRA requires data input for the association of the bitmap colours with the physical properties of materials and boundary conditions.

BISTRA calculates automatically a triangulation for the material colours. The system nodes are located in the triangle vertices. The temperatures in the nodes are calculated, from which all heat flows can be derived.

The time-dependent boundary conditions are described with functions, either built-in functions based on variable parameters, or external user-defined functions based on function values given at a fixed time interval.

BISTRA allows creating time-dependent graphic animations of the temperature field in the studied object. Alphanumeric lists of time functions of temperatures and heat flows can be made. Graphs using the text output data can be drawn e.g. in Microsoft Excel.

The RADCON module, which allows a better simulation of radiation (using view factors) and convection, is available in BISTRA and is required for fire simulation.