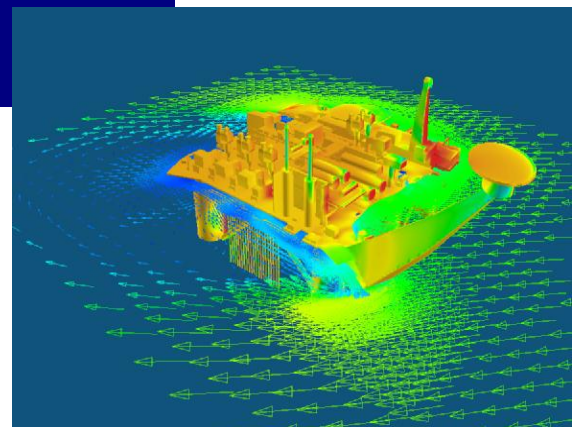
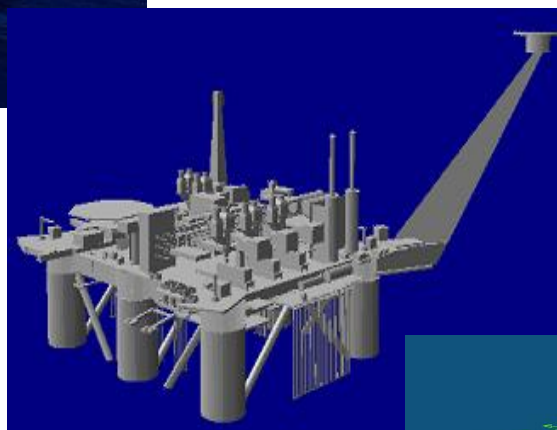


PHOENICS

News



Autumn 2005



News from the pioneers of computational fluid dynamics

INTRODUCTION



In the last newsletter, we announced the release of PHOENICS-3.6, and welcomed several new agents and representatives for PHOENICS around the world. This issue of PHOENICS News focuses on several new initiatives concerning partnerships and products.

Our current partnerships with organisations such as Vector AS for Windsim, MFRDC for MIGAL, CSI for GeoGrid, and Denford Ltd for the F1-In-Schools programme, all remain in force with continued growth expected for 2005/2006. Last year, we signed another collaborative agreement with Hevacomp Ltd, which will come to fruition this autumn in the form of a new Dynamic Thermal Simulation package for the building services community.

Now, we are pleased to announce the availability of a new PHOENICS Unstructured Grid Option [PH-UGO]. Marketed exclusively by CHAM, PH-UGO is released as a result of collaboration between CHAM Ltd and Symban Power Systems Ltd to incorporate its APUS-CFD product within our suite of PHOENICS software.

Read on to find out more.

Peter Spring

BENELUX MEETING REVIEW

The 2005 PHOENICS Users Meeting for the Benelux region was held at the Aristo Centre in Eindhoven on 24th May. Our thanks go to Sylvie Stevens, and to Geert Janssen of A2TE, for their splendid organisation of a very successful event.



ARISTO EINDHOVEN

Several of the presentations concentrated on the application of PHOENICS to HVAC and fire-related cases so the audience was particularly interested to learn of the FLAIR updates available with PHOENICS-V3.6.1.

As one might expect, most of the 30 delegates came from Belgium and Holland but we had quite a few welcome additions from Germany and the UK.



CHAM's John Ludwig (right) shows PHOENICS representatives Geert Janssen (centre) and Hans Mindt (left) just how high they are required to jump.



Pictures courtesy of Dr David Glynn, Flowsolve Ltd

A CD of the presentations made during the meeting is available for order from Petula Smith, email: ps@cham.co.uk.

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Offshore rig in Brazil
Pictures courtesy of CHEMTECH

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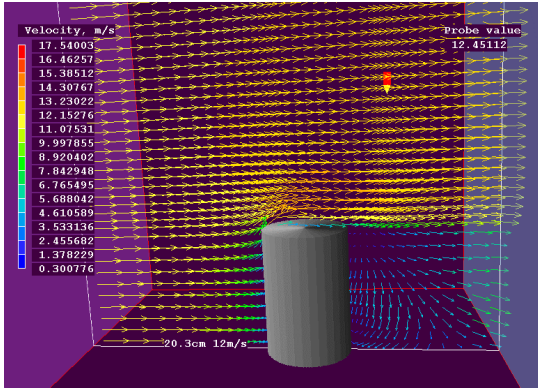
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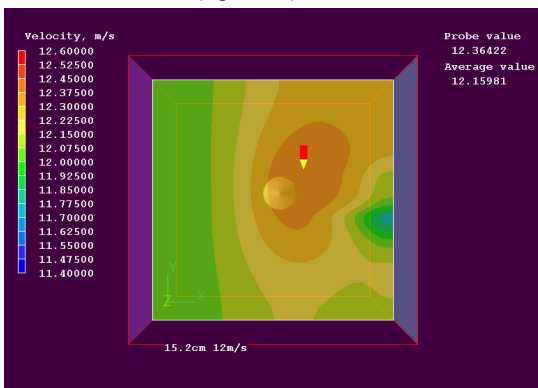
PHOENICS On-Line CUSTOMER

ECOTÉCNIA has been carrying out activities in the field of renewable energies since its foundation in 1981. It designs, manufactures and operates its own wind turbines, building "turnkey" wind farms for customers and assembling solar energy installations.



Within the wind farm projects development and engineering department, intensive on-field wind measurements are performed at about 200 sites spread around the globe. Measurements are made by anemometers located on top of tall (40-70m) tubular masts to represent, as accurately as possible, the turbine hub-heights currently in the range of 70-100m.

In our department, the PHOENICS On-Line service has been used to investigate the influence of the geometry of these masts on the flow measured by the anemometer (figure 1).



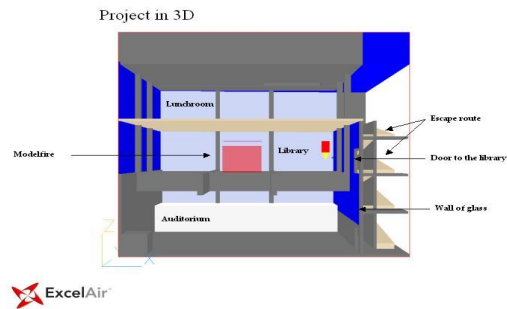
The simulations have been run at different distances from the mast top, for different mast diameters and for different wind speeds. The results have allowed us to get a complete quantitative picture of the phenomenon (figure 2) and agreed well with the measurements available.

More information pmoreno@ecotecnia.com

A REAL LIBRARY CASE

Dutch consulting firm, Excelair Bv, used PHOENICS-3.5.1 with FLAIR for a study of fire and smoke spread in a library within an Academy in Maastricht. The particular concern was the effect of fire and smoke on the emergency stairwell escape route.

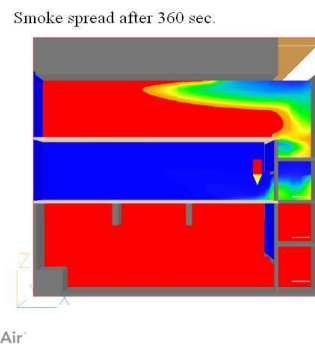
In the simulation shown, the door to the library to the escape route is open. A 5MW fire with a size of 3 x 3 metres was defined using data supplied from the Fire Research Station.



The fire was simulated for the first 600 seconds - perceived to be the most critical period while people escape.

The conclusions drawn from the study were that the smoke and gas temperatures in the first phase of the fire (up to the critical 600 second limit) are sufficiently low that this would not have any adverse effect for people escaping.

After 300 seconds, the smoke has finally spread to the escape route (stairwell). Up until that point, people can escape with good visibility (> 30 meters) in the stairwell. After that time people have to escape through the smoke, but the distance to a smoke free zone is then less than 30 meters.



Calculation of smoke spread in time in an academy. On the second floor (library) is a bookshelf on fire with the door open to the escaping route (stairwell).

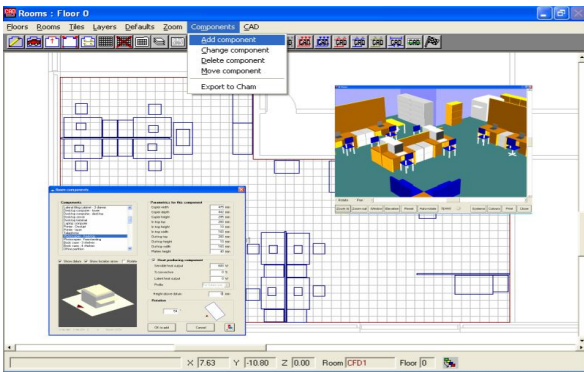
Bert Bron, ExcelAir b.v., www.excelair.com

HEVACOMP - CFD

Hevacomp (formed in 1981) is the firmly established UK market leader in building services design and CAD software. Hevacomp software is acknowledged as the industry standard, with over 2000 user sites - the largest user base of any developer in the building services field.

Inline with Hevacomp's vision to bring Dynamic Thermal Simulation and CFD analysis within easy reach of every engineer, Hevacomp has joined forces with CHAM. A new module will be available in late summer that will link Hevacomp's new Dynamic Thermal Simulation package to CHAM's PHOENICS CFD solver.

The room geometry information, including the surface temperatures and convection coefficients, together with room objects like diffusers and heat sources, will be parametrically created in Hevacomp's new Simulation module. The complete input file will be passed to the CFD solver provided by CHAM.



A key issue was the accurate modelling of diffusers and grilles. CHAM in co-operation with Hevacomp has implemented diffuser objects based on ASHRAE research.

The new Hevacomp Simulation package enables detailed heat gain simulations with detailed shadow analysis, heat loss simulations, summertime temperatures including mixed mode ventilation studies, overheating frequencies and extensive energy consumption and carbon calculations studies.

HEVACOMP

www.Hevacomp.com

CONNELL WAGNER FIRE STUDIES ON WEMBLEY STADIUM

This international sporting icon is in the course of being redeveloped to uphold the unrivalled status of this unique venue well into the 21st century. A comprehensive fire engineering review has been undertaken by Connell Wagner, with the aid of PHOENICS, to ensure compliance with Building Regulations as well as conformance to the United Kingdom Green Guide principles for sports stadia.

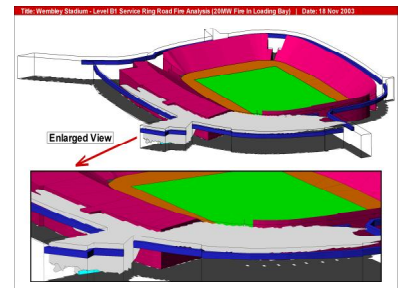


In support of the fire engineering review, substantial CFD modelling was undertaken to demonstrate compliance with performance requirements. A key design requirement is the use of passive architectural measures as opposed to mechanical smoke management systems, as this approach provides the greatest reliability as well as lowest cost.

An unusual feature of this stadium is that it incorporates an underground service "ring road" below the stadium pitch arena, primarily for access and parking facilities for service and outside broadcast (OB) vehicles. This area is effectively similar to a road tunnel and an effective mechanical smoke extraction system needs to be designed to meet regulatory requirements.

Fires up to 35MW were considered. The fire is assumed to occur within an OB vehicle or similar truck. Various case scenarios were considered,

including different fire locations and sizes, different mechanical extraction rates, and with and without the influence of a sprinkler system activated.



The results from the CFD analysis were used to ensure the mechanical extraction system satisfied the criteria of indefinite tenability beyond 60m either side of the fire location and below a vertical height of 2m for temperature and smoke.

Dr Eric Jal, Connell Wagner, email: JalE@conwag.com

WHAT'S NEW IN PHOENICS-3.6.1

Introduction

Many changes have been made in PHOENICS since the release of version 3.5.1. They include:

- The extension of the PHOENICS object concept to permit both geometric and non-geometric attributes to be stored together
- Provision of a 'guaranteed convergence' feature
- Further developments of fluid-structure interactions
- Provision of new features in the graphical user interface
- Improvements to FLAIR, the special-purpose program for HVAC and fires in buildings
- Extensions to the PHOENICS Commander
- Re-working of Shapemaker which can now add and store non-geometric attributes of objects, as well as creating their shapes
- Easier remote access via 'PHOENICS-online'
- Use of dynamic storage in all modules
- Restoration and extension of parallel-PHOENICS capabilities.

These changes, and the reasons for them, are described at

www.cham.co.uk/phoenics/d_polis/d_docs/tr006/tr006.doc

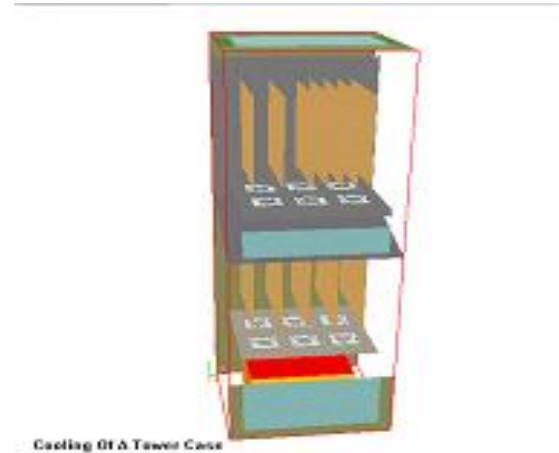
Selected pre- & post-processing options

Box Zoom

It has always been possible to zoom in and out in the pre- and post- processors. However this has required the user gradually to zoom into a particular viewpoint. A CAD-like facility has been added to box the area of interest and zoom in to the detail in one move.

Re-usable objects and groups of objects

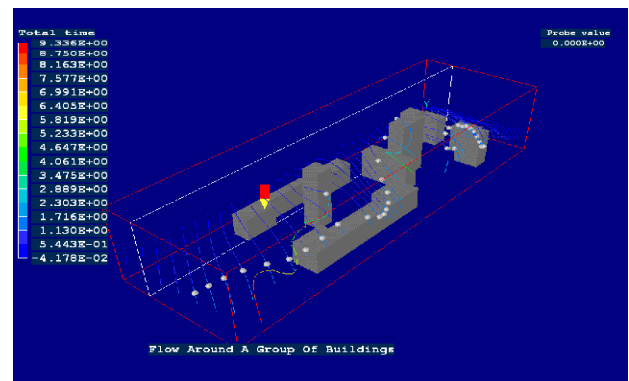
After spending the time and effort accurately modelling a heat source such as a rack of electronic equipment or the flow through a perforated floor, users may want to re-use these features in other models. PHOENICS now allows groups of objects, complete with their attributes (material type, temperature etc), to be stored for use on the next case.



Enhanced Flow Visualisation

PHOENICS now has a number of additional post-processing features to help present results such as...

- Animated streamlines
 - Segments
 - Vectors
 - Balls
- Recording of pan/zoom/fly-through
- Multiple contour planes
- Highlight min/max values
- Vector width control for clarity of viewing



Animations

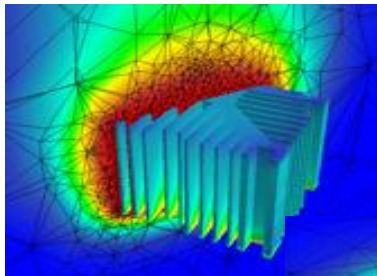
Although streamlines can be animated, this is not the same as being able to record zoom, pan or fly-through of a model for subsequent presentations. A camera button has been added to the Viewer handset to allow the recording, playback and saving of a series of screen movements in GIF or AVI format.

ANNOUNCING A NEW PHOENICS UNSTRUCTURED GRID OPTION

In response to requests for an unstructured grid option within PHOENICS for a certain range of applications and vertical markets, CHAM has signed an exclusive agreement with UK software developer Symban Power Systems Ltd, to apply and distribute its APUS-CFD package.

APUS-CFD is a robust, fully interactive, **Arbitrary Polyhedral Unstructured Solver**. APUS-CFD combines a powerful mesh generation and flow visualization tool and provides a complete solution from model-building to automatic mesh generation; from parallel and grid computing to real time visualization; all in a truly integrated and interactive environment.

When fully integrated with PHOENICS, this new option will become known as PH-UGO. However, whilst there is commonality with PHOENICS via STL geometry import, at present, APUS-CFD remains a separate CFD code and user-environment.

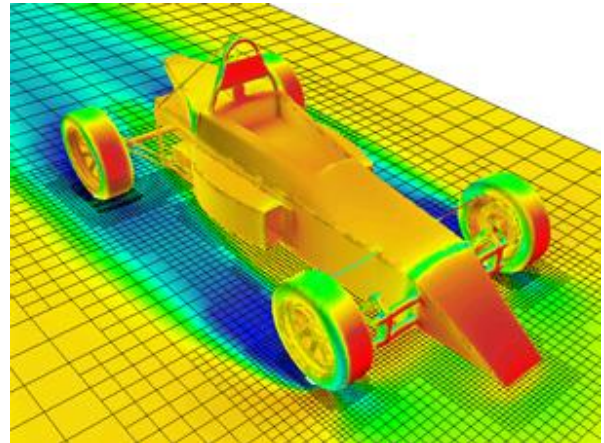


Temperature contours in the proximity of a Heat Sink

The integrated model builder, mesh generator, pre-/post-processor, solver and real time visualization, allow the user to:

- Build complex models from pre-built assemblies and imported STL files or other CAD geometries;
- Generate automatically high-quality hexa-dominant meshes from complex geometries;
- Interact with the system in real time, allowing to change solution parameters, without stopping the solver execution;
- Visualise field values (contours and vector displays) while the solution progresses;

- Access and post-process the solution data in a flexible manner (contours, vectors, iso-surfaces, streamlines, XY plotting).



Pressure contours on the surface of a Formula-1 car

The APUS-CFD modelling capabilities include:

- Space: zero-dimensional (one arbitrary polyhedral cell), one-dimensional, two-dimensional, axi-symmetric and three-dimensional
- Grid refinement
- Steady-state or transient analysis
- Incompressible or compressible flows
- Inviscid, laminar or turbulent flows
- Convective heat transfer, including natural or forced convection
- Conjugate heat transfer (coupled conduction/convection)
- Unlimited number of scalar variables
- Arbitrary volumetric sources of heat, mass, momentum, turbulence, and chemical species
- Built-in boundary objects: volume resistance, face resistance, thermal resistance, etc.
- Temperature-dependent material properties
- Flow in porous media
- Flexible user programming
- Parallel processing
- Remote and Grid Computing

Validation

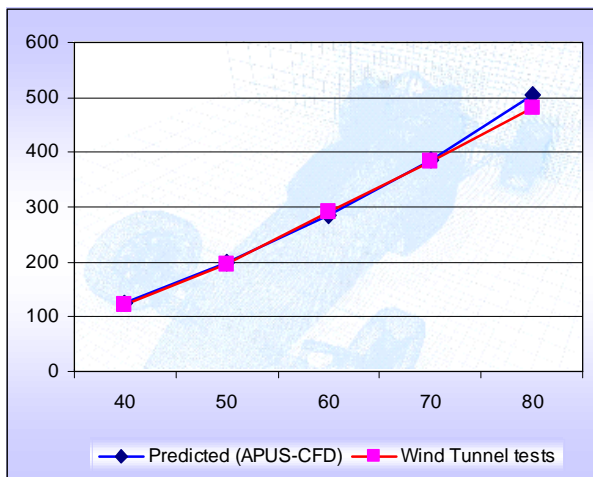
APUS-CFD has been benchmarked and validated on a number of industrial applications, including the test-cases of the participating organizations in the EU-funded project called FLOWGRID.

Recently, APUS-CFD has been benchmarked, on a case provided by CHAM, to predict the drag force on a Formula-Vee car at different wind speeds.

The mesh was generated automatically from an STL file (1.039 Million cells). The turnaround time including mesh generation and running the solver was 3 hours on a single CPU AMD Opteron (2.19 GHz).

Drag Force (N) on a Formula-Vee car		
Wind Speed / mph	Predictions (APUS-CFD)	Wind Tunnel tests
40	124.59	120.5
50	197.58	195.5
60	283.80	292.5
70	386.78	384.6
80	503.88	479.8

The results show good agreement with wind tunnel tests. Contours of pressure on the surface of the car are shown in the picture on page 6 above, for a wind speed of 70 mph.



Comparisons of Drag Force (N) against wind speed (mph)

Prices for this new option will be announced shortly but are likely to be similar to CHAM's current pricing structure for PHOENICS.

Combined PHOENICS / APUS-CFD licensees will benefit from discounted terms. For further information, contact the Sales Dept or email: sales@cham.co.uk



PHOENICS ON-LINE UPDATE

PHOENICS On-Line continues to be a popular method for both evaluating and using PHOENICS. Several tens of customers now access PHOENICS On-Line as their preferred style of using the code.

The system is simple enough – all you need is “faster-than-dial-up” access to the Internet. CHAM makes an all-inclusive monthly charge for unlimited 24/7 access to servers comprising of multiple 3GHz PC computers. Once a username and password has been supplied, customers gain access to two versions of PHOENICS – currently, PHOENICS-3.5.1 and PH-3.6.0 that will shortly be replaced by the PH-3.6.1 release described in this newsletter.

Using the PHOENICS Commander style, prospective customers can evaluate PHOENICS via the free “Look Learn Try” facility.

CHAM's sales personnel and agents alike also use PHOENICS On-Line for “remote” demonstration purposes. Consequently, customers can view on their own systems, example cases as they are being created and run from CHAM. This facility provides similar benefits to customer cases requiring investigation by CHAM's Technical Support Team.

PHOENICS ONLINE

Welcome to PHOENICS Online from CHAM Ltd, bringing fluid-flow simulation to your desk.

Click below:

- Look, Learn and Try** - To view flow simulations performed by PHOENICS and to make some yourself.
- Pre-arranged Demo** - To participate in a live demonstration or guided tour.
- Enquiries** - To ask questions, arrange a demonstration, register as a PHOENICS user or other requests.
- Registered User** - To continue your work with the PHOENICS Online service.

Software Requirements: Internet Explorer 5 or later, Netscape 6 or later, Opera 5 or later. All with 128-bit SSL support, cookies and javascript enabled.

powered by **innovative**

© Concentration, Heat and Momentum Ltd 2004

PHOENICS Online provides customers with interactive access to PHOENICS via the Internet. Unlimited use for one all-inclusive monthly payment. The service is ideal for short-term or project-based use of the code, or for those wishing to gain access from multiple locations. All you need is access to the Internet.

Call CHAM today to arrange a free trial.

DISPERSION OF AIR-BORNE POLLUTANTS

By Andrea Vignaroli, Department of Industrial Engineering of the University of Perugia, Italy.

WindSim, a PHOENICS-based Special-Purpose-Product (SPP), developed by the Norwegian company VECTOR AS was launched the summer 2003. WindSim is user-friendly software for the simulation of local wind field in complex terrain. In particular the software has been used within the wind energy sector for prediction of the energy production obtained from wind turbines.

Now VECTOR AS is enlarging the application field of the product to the simulation of dispersion of air-borne pollutants. The realization of this extension is a co-operation between VECTOR AS, the Dept of Industrial Engineering of the University of Perugia and Demetra Research Laboratory, also in Perugia. Similar to the development towards wind energy the aim is again to offer user-friendly software for dispersion modelling and evaluation of environmental risks.

Applicability Fields

- **Spatial Scale:** local and meso scale;
- **Territory type:** every kind of site;
- **Time Scale:** every kind of period (from 1 hr to a year);
- **Source type:** every kind of source like point, line and surface sources;
- **Pollutant type:** non-reactive primary pollutant.

The code can be applied to common situation: as the dispersion from a chimney, the analysis of air quality near a factory or a waste treatment plant, the study of an accidental release to the evaluation of a year averaged concentration map.

The use of a CFD solver gives the software good predictive performance even in complex terrain where other methods do not perform very well.

The software can be used for the interpretation and extrapolation of measured data in the area of interest. It can be used in particular for the evaluation of environmental impact of future factories or infrastructures.

About Dispersion Modelling

The phenomenon of dispersion of air-borne pollutant is modelled with two approaches supported by the PHOENICS solver:

- GENTRA for particle pollutant;
- PASSIVE DISPERSION for gas pollutant or smell.

About Output Data

These are the output selected referring to the environmental prescriptions:

- concentration map of accidental release;
- concentration map of short term simulation for a given wind speed and direction;
- concentration map of a long term simulation for a given climatology;
- 3D visualization of the concentration field.

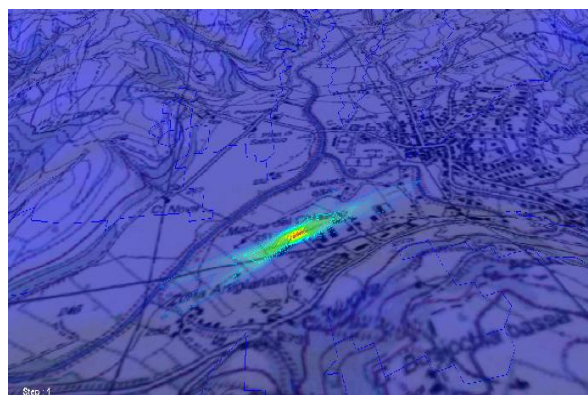


Fig.1: Long Term simulation using GENTRA



Fig.2: Short Term simulation using PASSIVE DISPERSION

For further information please refer to <http://windsim.com>

NEWS AND EVENTS

SIA International Congress

Venue: SIA, Lyon
Date: 26th to 27th October 2005
Hosted By: Société des Ingénieurs de l'Automobile
Contact: Marc Charlet
Tel: +33 1 41 44 93 75
Fax: +33 1 41 44 93 79
Email: marc.charlet@sia.fr

Fire Safety in Terrestrial Passenger Transportation Congress

Venue: University of Cantabria, Santander
Date: 20th October 2005
Contact: Juan Sole, Aertia Software SL
Tel: +34 9 3265 1320
Fax: +34 93 265 2351
Email: jmsole@aertia.com

ASME 2005 Summer Conference

Professor Brian Spalding delivered a keynote address entitled '[A Simplified CFD Method for the Design of Heat Exchangers](#)' at this year's ASME 2005 Summer Conference on Advanced Computational Methods and Applications for Heat Exchanger Design. The conference was held in San Francisco from 17th to 22nd July.

3-day PHOENICS Training Courses

Venue	Dates
CHAM	20 th to 22 nd September 2005
CHAM	15 th to 17 th November 2005
Tel:	+44 (0)20 8947 7651
Fax:	+44 (0)20 8879 3497
Email:	sales@cham.co.uk

1-day PHOENICS Introductory Seminars

Venue:	Dates:
CHAM	28 th September 2005
CHAM	25 th October 2005
CHAM	29 th November 2005

WindSim Update

VECTOR will present WindSim at the following upcoming exhibitions.

Rome, 29th September – 1st October 2005,
Eolica Expo Mediterranean

www.eolicaexpo.com/en/

Husum, 22nd-24th September 2005,

HUSUMwind

www.husumwind.com/english/index_e.html

Athens, 27th February – 2nd March 2006, EWEC

www.ewea.org/06b_events/events_2006EWEC.htm

CFD Online

Share news, views and experiences with other PHOENICS users via CFD Online – a free service for all.

www.cfd-online.com/Forum/phoenics.cgi

Now this is practical fluid flow analysis !



Professor Brian Spalding indulges in some experimental "white knuckle" hydrodynamics studies during a visit to the Mercer River in July 2005

STANDALONE PHOENICS VIEWER

PHOENICS licensing options have been extended to offer the VR-Viewer as a stand-alone product, enabling clients to display and present results on multiple systems whilst retaining the solver elsewhere. PHOENICS On-Line users will benefit similarly.

Prices for the VR-Viewer start from £500 – contact sales@cham.co.uk for further information



PHOENICS News is designed and compiled by Peter Spalding

Comments and articles for future publication should be sent to:

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EGYPT - Hydro Consult

email: elbaz@link.net

FINLAND - GEM Systems

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web: www.gemsystems.fi

FRANCE – Arcofluid

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ITALY - Lasertec SRL

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web: www.cybronasia.com

MEXICO - Vortex de Mexico

email: vortexmx@prodiqv.net.mx

MIDDLE EAST - Locke Carey Consultants

email: lcfsc@lockecarey.ae
web: www.lockecarey.com

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NORWAY - LM FlowConsult

email: terje.toften@larsmyhre.no
web: www.afconsult.com/

RUSSIA – Science Service Centre

email: algin@online.ru

SPAIN - Aertia Software SL

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web: www.aertia.com

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web: www.c-h-a-m-p-i-o-n.com.tw

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email: tony.smith@thermofluids.co.uk
web: www.thermofluids.co.uk

UK - Flowsolve Ltd

email: cfid@flowsolve.com
web: www.flowsolve.com

UKRAINE - IET, NAS

email: ksg@vortex.org.ua
Web: www.itf.kiev.ua

USA / CANADA – ACFDA

email: acfda@sympatico.ca
Web: www3.sympatico.ca/acfda

USA - DD&G Inc

email: parisp@bellsouth.net



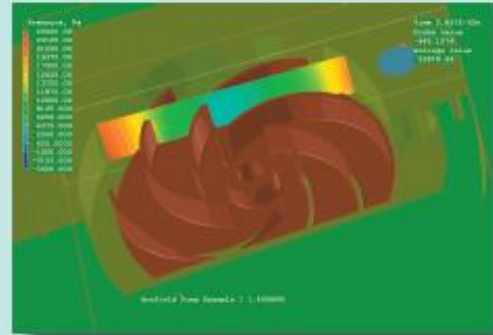
“Introduction to PHOENICS” 1/2-Day Seminar and free 30 day trial



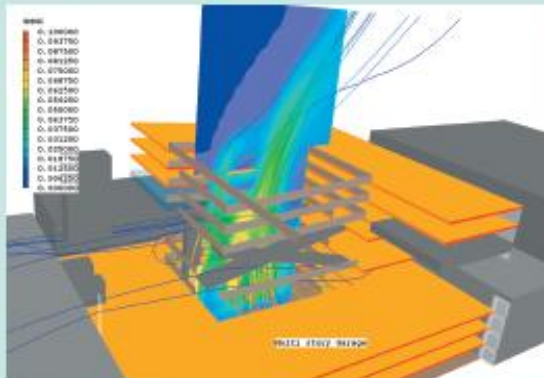
If it FLOWS - PHOENICS can model it

You are cordially invited to attend a 1/2-day “introduction to PHOENICS” seminar to be held at CHAM’s offices in Wimbledon on 29th November.

The seminar is designed to provide an overview of the wide range of flow modelling capabilities within PHOENICS together with the latest post-processing flow visualisation and animation tools that are included as standard. No prior CFD experience is required and all participants qualify to use the software for a free evaluation period.



Engineering - Impellor pump efficiency



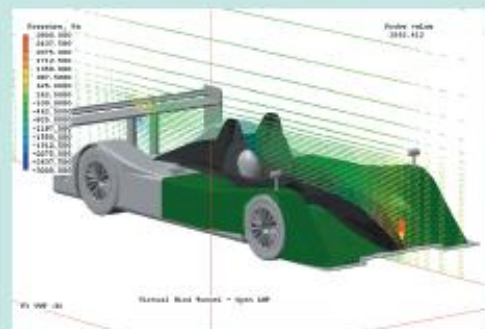
Buildings - HVAC, fire & smoke spread

Visitors will have the opportunity to view and use the software for themselves, as well as to discuss problems of specific interest with CHAM’s technical personnel.

Presentation materials, refreshments and a buffet lunch will be provided.

Topics covered by the seminar will include:

- Creation & importing of complex geometries
- Modelling moving bodies eg impellor pumps
- Ventilation
- Easy input of user-defined formulae
- Using PHOENICS on-line
- Results analysis with the VR-Viewer
- Creation of animations
- Overview of the new PHOENICS Unstructured Grid Option.



Aerodynamics - Wing & race car design



**“Introduction to PHOENICS”
1/2-Day Seminar
and free 30 day trial**



If it FLOWS - PHOENICS can model it

Details of CHAM Limited and PHOENICS can be found by accessing CHAM's web site at: www.cham.co.uk. The seminar will start at 9:30 and finish with a buffet lunch at 13:00. An optional hands-on workshop session will be run in the afternoon for those wishing to evaluate the software further.

To register for the seminar on the 29th November please complete your details below and fax this form to CHAM on 020-8879-3497

First attendee/ Title:	_____
Name:	_____
Second attendee / Title:	_____
Name:	_____
Organisation:	_____
Address:	_____

Tel:	_____
Fax:	_____
E-mail:	_____

Topics of interest:

CFD experience:

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