

## DISPERSION OF INDUSTRIAL EMISSIONS

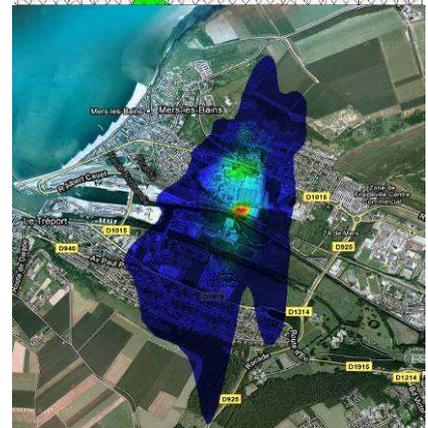
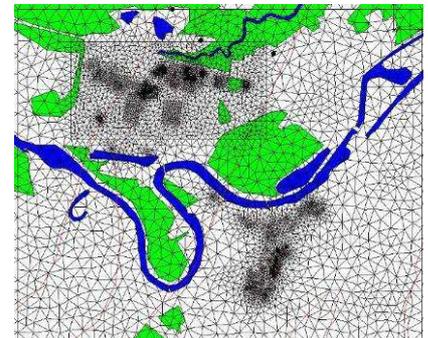
### IMPACT STUDIES

*fluidyn*-PANEIA is a software dedicated to the environmental impact assessment of industrial sites on air quality and health. *fluidyn*-PANEIA models the atmospheric dispersion of industrial emissions in the air, released from point or continuous sources.

*fluidyn*-PANEIA is a module of *fluidyn*-PANACHE and integrates its 3D Computational Fluid Dynamics principles for air quality prediction, thus taking into account, **topography**, **obstacles** and **buildings**, influence of **vegetation** and **complex terrain** on the dispersion and meteorological parameters, like solar radiation and ambient weather conditions.

*fluidyn*-PANEIA is designed to aid environmental engineers, project managers as well as decision makers to conform or ensure that their industrial sites comply to the statutory directives imposed by the national regulatory bodies for atmospheric air quality and subsequent environmental and health impact.

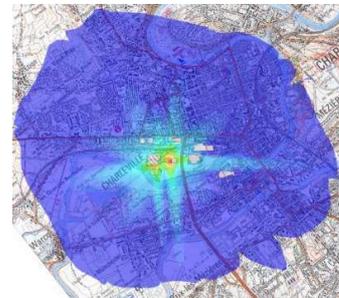
- Atmospheric dispersion of pollutants (gas, smoke from combustion, dust, odours, legionellas, VOC,...),
- Flow and turbulence around buildings and in complex terrains,
- Wind rose calculations,
- Source identification, retro monitoring,
- Efficiency of pollution control measurements,
- Optimising measurement networks on sites (pollution et wind),
- Plume visibility,
- Quantification elements for health studies (ERS),
- Design & optimisation of solutions to reduce industrial impact on the environment.



**METHODOLOGY:**

To model atmospheric dispersion, *fluidyn-PANEIA* uses a 3D deterministic solution of the fluid dynamics Eulerian equations. The pollutant dispersion is simulated by the resolution of the Navier-Stokes flow and transport equations applied to a 3D curvilinear mesh. The software simultaneously solves 3D atmospheric flows and the pollutant transport/diffusion. In this context, all the phenomena and parameters influencing the atmospheric dispersion of pollutants are taken into account:

- 3D complex topography,
- Ground occupation parameters (urban areas, forests, water bodies...),
- Buildings and obstacles,
- Meteorological conditions (fixed or variable),
- Atmospheric turbulence,
- Pollutant properties (NO<sub>x</sub>, SO<sub>2</sub>, CO, C<sub>6</sub>H<sub>6</sub>, dust, VOC, heavy metals, etc.).



The pollutants are dispersed in the atmosphere over a flat or complex terrain, with or without obstacles, over a distance ranging from a couple of meters to hundreds of kilometers. *fluidyn-PANEIA* automatically takes into account the flow characteristics in the atmospheric boundary layer (shear effect, vertical stratification of temperature..) and is also integrated with several buoyancy models.

**HARDWARE ENVIRONMENT :**

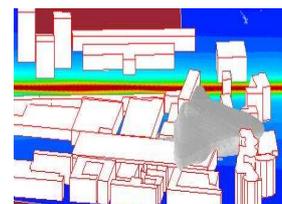
*fluidyn-PANEIA* works on all PC platforms (Windows, Linux) as well as on Unix work stations and mainframe computers.

*fluidyn-PANEIA* is a fully integrated software, including a pre-processor, a numerical solver and a post-processor. The user interface is designed to be user-friendly, from the preparation of the case to the interpretation of the results. *fluidyn-PANEIA* can also be modified to integrate an interface to other input / output utilities.

**CUSTOMERS :**

Industries, consultancy firms, architects, consultants, pollution control organisms,...

*fluidyn-PANEIA* has been especially designed for engineers without expertise in Fluid Dynamics or numerical simulation while offering state-of-the-art technology in the field.

**REFERENCES :**

ALGADE, ALTRAN, ANTEA, APAVE, BIOCITECH, BUREAU VERITAS, BURGEAP, CEM, CENTRALE DES CARRIERES, CHU Clermont-Ferrand, COELYS, ESCOTA, EADS, GORONICKEL, IDE, INEOS, NEXTER, NORISKO, PREVENTEC, RATP, SAINT-GOBAIN, SETUDE, SHELL, SIAAP, SOFRESID, SOLVAY, TIOXIDE, TOTAL, UNIVERSITE de LIEGE, UNIVERSITE de MULHOUSE, UNIVERSITE de REIMS, VEOLIA, VISTEON ...

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