

PHOENICS/FLAIR-EFS

[External Flow Simulator]

CFD software for fluid flow simulation for the external built environment

PHOENICS/FLAIR is a CFD software package specialising in the simulation of scenarios involving fluid flow, heat transfer, combustion and chemical reaction processes occurring in the built and natural environment. FLAIR is utilised by architects, design engineers and safety officers concerned with the performance of air-flow systems for both the internal and external environment.

Base upon the VR Menu used by PHOENICS/FLAIR, **FLAIR-EFS** is a reduced-cost subset for users concerned only with the external environmental conditions surrounding buildings and other structures.

The function of **FLAIR-EFS** is to simulate the air flow, temperature distribution and pollutant concentration around individual or groups of buildings.

It will predict:

- Forces on the exterior of buildings, roofs and walls.
- Pedestrian comfort information including:
 - Wind Amplification Factors.
 - Probability of the wind speed to exceed a set threshold value
 - NEN8100 Dutch standard for Wind Comfort and Wind Danger in the Built Environment.
 - Other pedestrian wind comfort standards can be implemented.
- Rates of heat loss or gain between buildings, atmosphere and sky (prototype Heatisle module.)
- Dispersion and concentration of pollutants.

FLAIR-EFS intended for architects, building engineers, urban planners, local authorities and environment engineers. **FLAIR-EFS** enables users to visualise, understand, evaluate and refine the air-flow patterns in steady-state or time-dependent scenarios, in micro- as well as macro-scale.

FLAIR-EFS offers:

- CAD import and repair features.
- Grid generation with refinement in the region of interest.
- Wind and wind profiling.
- Solar gain.
- Interface to weather databases (eg Energy Plus)



FLAIR-EFS inputs include:

- CAD geometry file for the buildings and terrain.
- Size of the domain to simulate.
- Wind profile characteristics.
- Measured wind statistics.
- Size and position of a region of special interest.
- Resolution in the region of interest and the surrounding buildings.
- Configuration of result plots
- Other basic numerical settings.
- Heat energy sources, where required.

FLAIR-EFS enables plotting of:

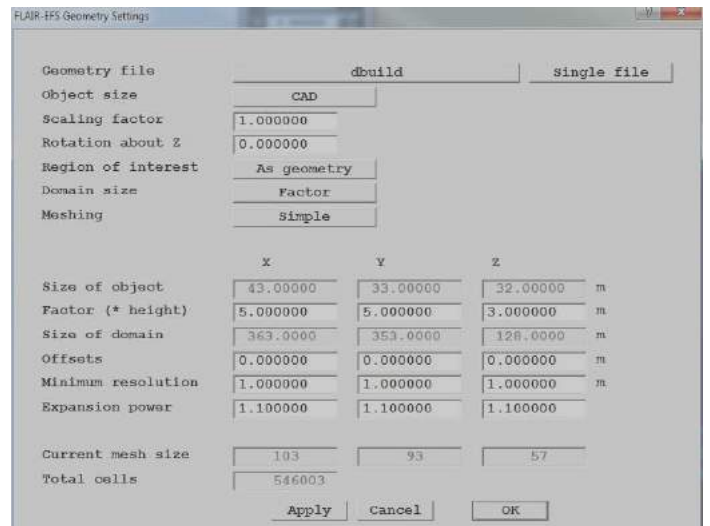
- Pedestrian wind comfort results at a user defined height
 - Wind Amplification Factor
 - Probability of the wind speed to exceed a set threshold value
 - NEN8100 Dutch standard for Wind Comfort and Wind Danger in the Built Environment.
- Wind forces
 - Pressure coefficients on the buildings
- Air flow patterns
 - Turbulence intensity
 - Streamlines
 - Iso-surfaces
- Temperature distribution / stratification
- Pollutant spread and concentration

FLAIR-EFS permits:

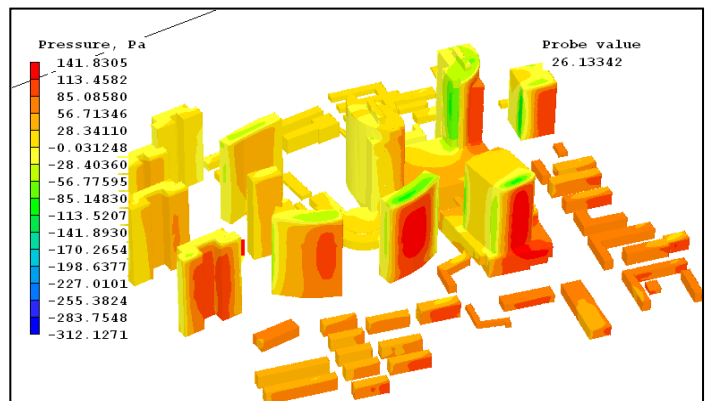
- Addition of user-defined functions
- Addition of user-defined materials
- Addition of user-defined properties

FLAIR-EFS applications include:

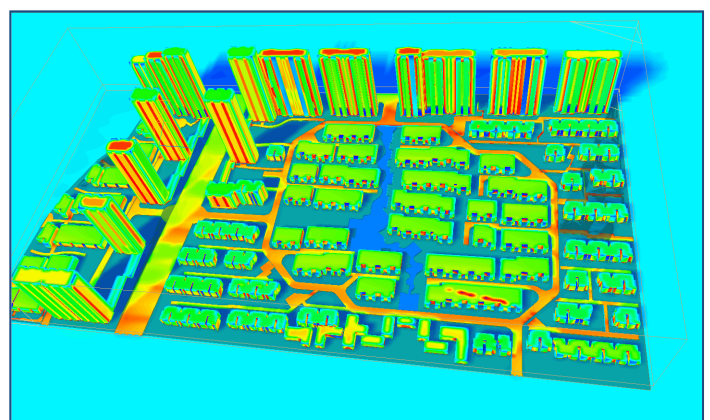
- Pedestrian comfort
- Pollutant release and spread
- Wind loading on structures
- Cityscape street canyons
- Urban Heat Islands (UHI)
- Hilly terrain



PHOENICS-VR Menu Style for FLAIR-EFS



Surface pressures on structures



Heat absorption and shading
[Prototype heat isle application]

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