

ultraFluidX is a simulation tool for ultra-fast prediction of the aerodynamic properties of passenger and heavy-duty vehicles as well as for the evaluation of building and environmental aerodynamics. Its cutting-edge technology is optimized for GPUs to deliver unbeatable performance and to allow for overnight simulations even of complex cases on a single server.

Product Highlights

- Lattice Boltzmann Method
- LES turbulence modeling
- Efficient GPU implementation
- Integrated, robust volume meshing
- Local grid refinement
- Real-world wind tunnels
- Integrated with Virtual Wind Tunnel

Benefits

With ultraFluidX, highly resolved transient aerodynamics simulations can be performed overnight on a single server. The benefits in detail are:

Fast and easy case setup

Thanks to seamless integration into the Altair Virtual Wind Tunnel, setting up an external aerodynamics simulation becomes trivial. Templates can be derived quickly for different vehicle classes, making the workflow less prone to errors.

Minimum preprocessing effort

Profit from the “Drag and Drop” nature of this Lattice Boltzmann implementation. Low surface mesh requirements, support for intersecting and penetrating parts, together with a fully automated volume mesh generation in the solver, make part replacements easier than in the wind tunnel.

Evaluating hundreds of configurations to satisfy legal regulations becomes feasible.

Short turnaround times enabling overnight runs

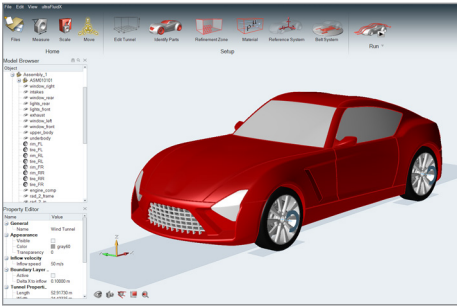
The Lattice Boltzmann Method is perfect fit for massively parallel architectures like GPUs, and sets the stage for unprecedented turnaround times. Overnight runs on single servers become possible by utilizing state-of-the-art GPU optimized algorithms, while delivering the fidelity of a transient LES aerodynamics simulation.

Significant cost savings

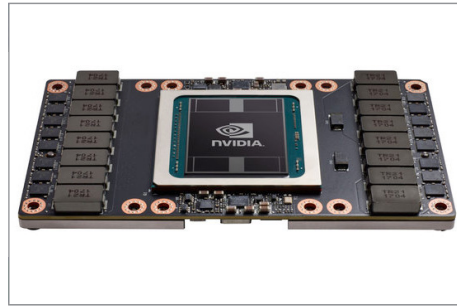
Conventional simulation approaches need thousands of CPU cores to achieve the turnaround times of ultraFluidX. Our GPU based solution increases throughput while reducing hardware and energy cost.

Learn more:

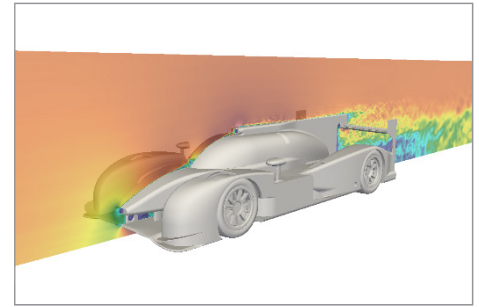
altairhyperworks.com/ultrafluidx



Intuitive case setup in the Virtual Wind Tunnel



Simulation on high-performance NVIDIA GPUs



Post-Processing of the transient flow field

Run transient

Bluff body aerodynamics, and especially vehicle aerodynamics, are highly unsteady by nature. With ultraFluidX well-resolved transient LES simulations become affordable. No need to press transient physics in a steady-state corset anymore.

Industry Applications

ultraFluidX is ideal for external aerodynamics investigations of ground transportation vehicles in a wide range of operating conditions.

Transient flow analysis

Determine aerodynamic forces and moments (e.g., drag, lift, roll, pitch, yaw) and investigate separated flow regions and vortices.

Reducing fuel consumption

Minimize the aerodynamic drag.

Improving driving stability

Balance front and rear lift and investigate the crosswind behavior.

AEC (Architecture, Engineering and Construction)

Analyze wind loads on buildings and the propagation of pollutants.

About FluidDyna GmbH

FluidDyna provides a wide range of research and development services. Being comprised of the terms “Fluid” and “Dynamics”, its name already indicates the company's know-how and ultimate competitive edge. The core expertise lies in the development and application of numerical methods for flow simulation and thermodynamics.

Additionally, FluidDyna specialize in the demanding field of GPU-based High Performance Computing for fluid mechanics. The team provides assistance for both customers who require advice on how to configure a GPU-based supercomputing system and for companies and institutions with a need for tailor-made CFD software.

Founded in 2006, the company has excellent references and partnerships, which includes

Altair Engineering, Inc. FluidDyna's solutions have been commissioned by manufacturers and suppliers of passenger and commercial vehicles, civil and military aircrafts, the pharmaceutical industry and its suppliers as well as research institutes and public-sector clients.

“ultraFluidX is the answer to challenges automotive OEMs have been facing in their aerodynamic development process over the last decade. Transient, highly resolved simulations used to be expensive and constraint by resources. Our GPU based Lattice Boltzmann solver ultraFluidX cuts down turnaround time and cost, and paves the way for wide use of affordable high-fidelity aerodynamics simulations.”

Dr.-Ing. Thomas Indinger, CEO
FluidDyna GmbH