

nanoFluidX is a particle-based (SPH) fluid dynamics simulation tool to predict the flow in complex geometries with complex motion. It can be used to predict the oiling in powertrain systems with rotating shafts / gears and analyze forces and torques on individual components of the system. Utilizing the GPU technology empowers high-performance simulations of real geometries.

Product Highlights

- Particle-based (SPH) fluid dynamics simulation
- Meshless method to simulating complex fluid flow
- Superior performance due to high-density GPU computing
- Well suited for elaborated powertrain applications – gearboxes, crankshafts, etc.

Benefits

The particle-based nature of the nanoFluidX code allows for an elegant and efficient approach to flows which undergo high deformation during the simulation, such as sloshing, violent multiphase flows or rapid movement through complex geometry.

- **Simplified pre-processing**

Mesh in a classic sense is not needed. Import the geometry, select the element and generate the particles. No more hours of pre-processing and devising a good-enough mesh.

- **GPU computing**

The nanoFluidX team has been recognized as an NVidia Elite solution provider, allowing them a competitive edge in terms of code optimization

and performance. GPU computing provides a significant performance advantage and power savings with respect to their more cumbersome CPU counterparts.

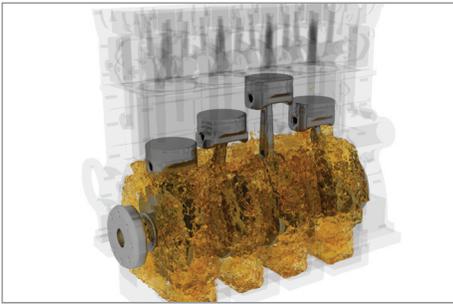
Simulate many rotations of a gear running at thousands of RPM in a matter of days, where classic finite volume CFD methods may require weeks to simulate only a few rotations. nanoFluidX brings you faster pre-processing, advanced GPU technology for minimum simulation time, and easy post-processing. Achieve a reduction in personnel and hardware costs with significantly faster turnaround time.

- **High-density ratio multiphase flows**

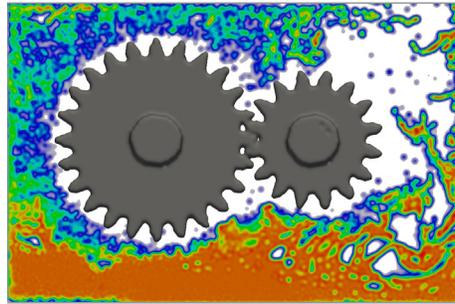
The Smoothed Particle Hydrodynamics (SPH) method of nanoFluidX allows

Learn more:

altairhyperworks.com/nanofluidx



Engine oiling



Air entrapment in oil (oil foaming)



Tank sloshing

for easy treatment of high-density ratio multiphase flows (e.g. water-air) without additional computational effort. The fluid interfaces are a natural by-product of the SPH method and no additional interface reconstruction is required, thus saving computational time.

- **Rigid body motion**

nanoFluidX allows for element trajectories prescribed by an input file. Study the interaction of a defined translating and/or rotating solid and the surrounding fluid. Observe the motion of a solid object affected by fluid forces and/or body forces such as gravity.

Industry Applications

nanoFluidX is ideal for many applications in different industries, including:

- **General free-surface flows**

Simulate sloshing of oil in the powertrain systems, free flowing fluids in an open environment, open or closed tanks under high accelerations and similar phenomena.

- **Rotating gears, crankshafts and connecting rods for powertrain**

nanoFluidX has implemented options for prescribing different types of motion, therefore simulating rotating gears, crankshafts and connecting rods comes easy. Measure forces and torques experienced by the solid elements as they interact with the surrounding fluid.

- **Tank sloshing for automotive and aerospace**

Measure forces experienced by the tank or a vehicle during drastic acceleration, e.g. braking or sudden lane change.

About FluidDyna GmbH

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

Additionally, we are experts within the demanding field of GPU-based High-Performance Computing for fluid mechanical problems. FluidDyna 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 individually programmed, customized software for CFD.

Many customers reaching the limits of their current software toolchain approach FluidDyna to create perfectly tailored tools and to take over the modeling and simulation of fluid mechanical challenges.

Founded in 2006, the company already has excellent references and partnerships, which include Altair Engineering, Inc. FluidDyna’s solutions have been commissioned by manufacturers and suppliers of passenger and commercial vehicles, civil and military aircrafts as well as the pharmaceutical industry and its suppliers in addition to research institutes and public-sector clients.

“nanoFluidX provides customers with a unique and powerful set of simulation capabilities for challenging industry problems in CFD like powertrain oiling or tank sloshing. The ultra-fast simulations based on GPU technology make the software unrivaled in quality and efficiency.”

Dr.-Ing. Thomas Indinger, CEO
FluidDyna GmbH