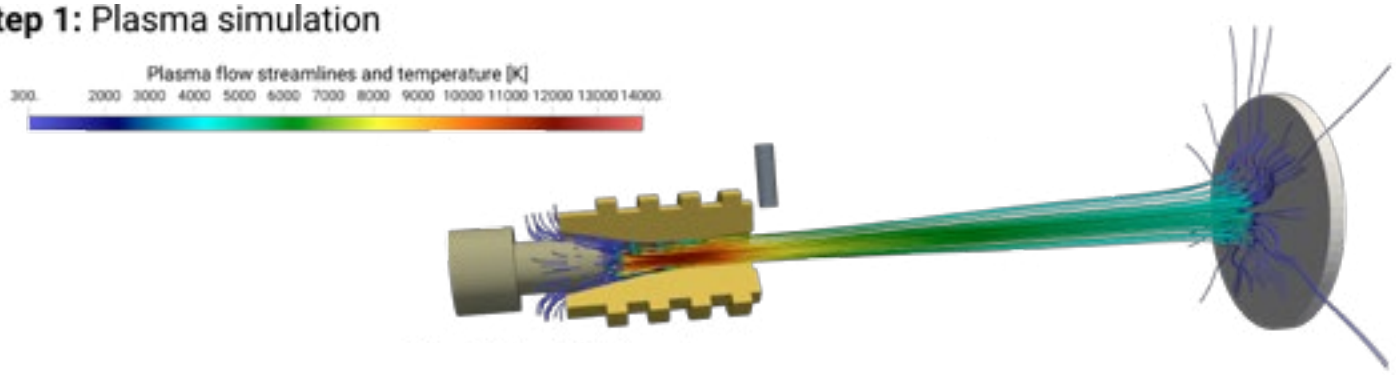
PlasmaSolve
Tailored physics simulation solutions

Speed up research, reduce development costs, truly comprehend the process and optimize the product.

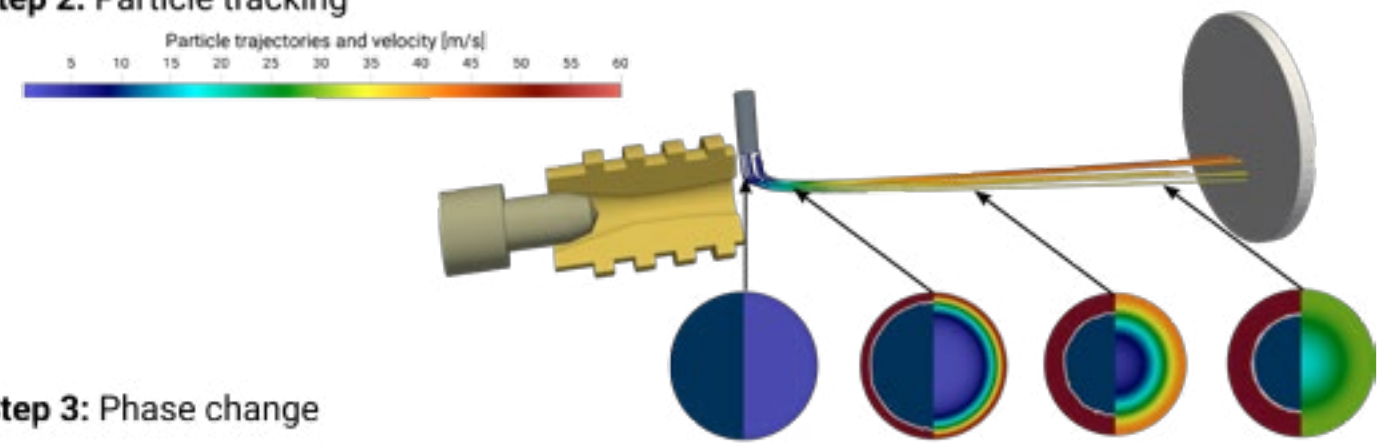
Thermal Plasma Spraying Simulation

The irreplaceable role of thermal plasma spray in preparation of thermal barrier, tribological and or anti-corrosion coatings makes the technology a hot candidate for computer simulation. The physics of the process has been studied by many, who we now learn from. To bring thermal plasma spray simulation to a higher level, we integrated the models of plasma, the particle tracker and particle melting into a single suite. Next time you are developing a new plasma spraying process, try doing so cheaper and faster with the help of our models.

Step 1: Plasma simulation



Step 2: Particle tracking



Step 3: Phase change

Our codes are ready to answer specific R&D questions, such as

- What is the particle velocity upon impact
- Melting degree of feedstock particles upon impact (metal, alloy, ceramic or plastic)
- Effect of gas mixture (argon, argon/hydrogen, ...) and plasma power on temperature
- Heating of electrodes, electrode cooling design
- How much is the substrate heated
- Arc attachment position
- Plasma flow around complex 3D substrates and their coating

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Computer-aided engineering of thermal plasma spraying

Thermal plasma spraying is a complex multiphysics problem requiring self-consistent treatment of gas flow, heat transfer, current conduction in strongly non-linear media, motion of macro-particles through the torch as well as their phase change. To handle the gas flow, we use the finite volume method (FVM), tailored for convection problems, while the current conduction and Elenbaas-Heller heat equation are solved using the finite element method (FEM). By efficient in-memory coupling of the two methods, our code delivers superior performance to both pure-FEM and pure-FVM solvers.

Once we know the velocity and temperature fields, we trace feedstock particles through the calculated velocity and temperature fields and extract the gas temperature during their time-of-flight. Eventually, this is supplied to a detailed particle simulation to predict feedstock heating and melting.

About Us

PlasmaSolve was founded in 2016 by plasma physicists and software engineers to provide a platform for cutting-edge physics simulation services and research. We combine expertise in physics, cloud computing, high-volume data processing, automation, and management. Through that, we strive to deliver top-notch solutions, hand over the best of our knowledge and help our customers get miles ahead of their competition. Our people are truly motivated experts, passionate about science. We might be young but we are pretty good at what we do. Bring simulation on board with us!

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