

2018 AIAA Aerospace Sciences Meeting

On January 8th at the 2018 AIAA Aerospace Sciences Meeting in Kissimmee, Florida, we will present the first Large Eddy Simulation of a boundary layer induced by a non-neutral plasma discharge. The main hurdle that prevented such simulations to be performed until now was the large discrepancy between the time scales of the different fluids involved. Because the electrons travel at speeds exceeding millions of meters per second in the non-neutral plasma sheaths, the integration time step had to be kept to values not exceeding $10^{-12} - 10^{-11}$ second in order to prevent instabilities. But, to simulate efficiently a turbulent boundary layer using LES, a time step of at least $10^{-9} - 10^{-7}$ second needs to be specified or the simulation would require excessive computing effort. Here, we overcome this hurdle through the use of an advanced plasma model that can be integrated with large time steps suitable to LES while not leading to instabilities or to inaccuracies.

Find the slides and the paper attached in pdf form. To see the movies in the slides properly, you need to view them using Adobe Acrobat Reader.

[2018PDL_paper.pdf](#) [2018PDL_slides.pdf](#)