

## Electro-Convective Turbulence Experiment -transport phenomenon at stability boundary-

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Turbulent transport in the coexistence of turbulent and zonal flows in magnetically confined fusion plasmas has been actively studied. Recently, the importance of spatial inhomogeneity of turbulence has been pointed out, and some interesting research were reported [1-2]. We have been conducting experiments using electro-convection (EC), which has excellent controllability of non-dimensional parameters representing turbulent state such as Rayleigh numbers and Prandtl number. The diagnostic capabilities (two-dimensional turbulence, particle tracing) are also very important advantage in the experiment. In this research, we investigated transport phenomena in non-uniform turbulence, in particular, at turbulence stability boundaries.

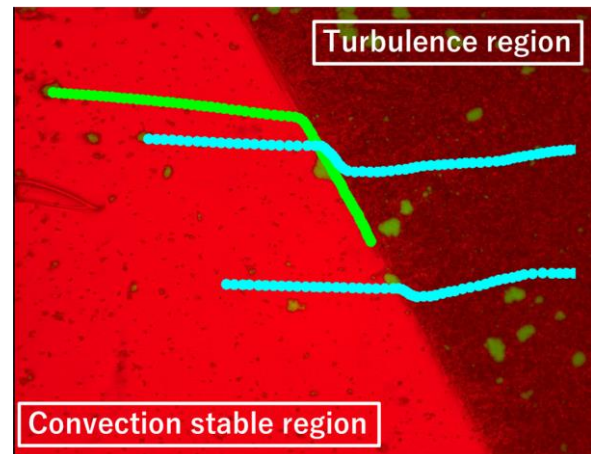
EC turbulence can be driven by applying a voltage to liquid crystal (MBBA) in which some fluorescent particles (tracer particles) were mixed. By using a pump, we drove the flow of the liquid crystal into the area where the EC turbulence was driven. The fluorescent particles were traced at the boundary from the convection stable region to the turbulence region. As shown in Figure 1, we found two types of particle trajectories: one enters the

turbulence region and the other fails to enter and flows along the turbulence stability boundary. For these two types of particle trajectories, we investigated the particle transport dependence on the particle size.

In this presentation, we will discuss about these particle transport properties in terms of particle radius thresholds.

### References

- [1] N. Mattor and P. H. Diamond, Phys. Rev. Lett. 72, 486 (1994).
- [2] M. Kobayashi, et al., Phys. Rev. Lett. 128, 125001 (2022).



**Figure 1** Trajectories of tracer particles which flowed from the convection stable region to the turbulence region. Green spots indicate the fluorescent particles.