Simultaneous estimation of transport and power deposition profiles and its consequences for transport

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In perturbative experiments, the power deposition profile is a crucial ingredient in the analysis of the (turbulent) transport [1, 2]. Typically, the deposition profile is calculated with a forward model and used for the computation of the transport [3, 4, 5]. We will show that allowing for uncertainties in the deposition profiles has significant impact on the estimated transport. In fact, such uncertainties can result in paradoxical results, such as apparent non-local transport and significant errors on the estimated transport coefficients such as diffusion and convective velocity [6, 7].

Therefore, it is important to not only assess the sources in the forward direction (ray-tracing) but also in the backward direction by extracting the (effective) deposition profiles directly from the measurements. We present recent results to show that this is possible in case of perturbative experiments and leads to non-paradoxical results. This will allow the next step in perturbative transport analysis in which we no longer need to know the deposition profile to assess the transport and gives a different view on non-local transport. This talk will show some state-of-the-art analysis techniques for perturbative analysis allowing for the simultaneous estimation of effective deposition profiles and transport coefficients which in principle is applicable to various transport channels.

References

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