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Mathematical equivalence of non-local transport models and broadened deposition profiles MATTHIJS VAN BERKEL, DIFFER, GERD VANDERSTEEN, VUB, HANS ZWART, UT, EGBERT WESTERHOF, DICK HOGEWEIJ, JONATHAN CITRIN, DIFFER, DRIES PEUMANS, VUB, MARCO DE BAAR, DIFFER, TUE (EINDHOVEN UNIVERSITY OF TECHNOLOGY) COLLABORATION, UT (UNIVERSITY OF TWENTE) COLLABORATION, VUB (VRIJE UNIVERSITEIT BRUSSSEL) COLLABORATION, DIFFER(DUTCH INSTITUTE FOR FUNDAMENTAL ENERGY RESEARCH) TEAM — Old and recent experiments show that there is a direct response to the heating power of transport observed in modulated electron cyclotron heating (ECH) experiments both in tokamaks and stellarators, which is commonly known as non-local transport. This is most apparent for modulated experiments in stellarators such as LHD and W7-AS. We show that this power dependence and its corresponding experimental observations such as the so-called hysteresis in flux [Inagaki, NF, 113006, 2013] can be reproduced by broadened ECH deposition profiles. In other words, many mathematical models proposed to describe non-local transport are equivalent to an deposition (effective) profile in its linearized forms [vanBerkel, NF, 106042, 2018]. This also connects with new insights on microwave scattering due to density fluctuations in the edge plasma which shows that in reality the deposition profiles are much broader than expected [Chellai, PRL, 105001, 2018] but it is unclear if this effect is sufficient to explain non-local transport. These relationships can be further studied by separating the transport in a slow (diffusive) and a fast (heating/non-local) time-scale using perturbative experiments.

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