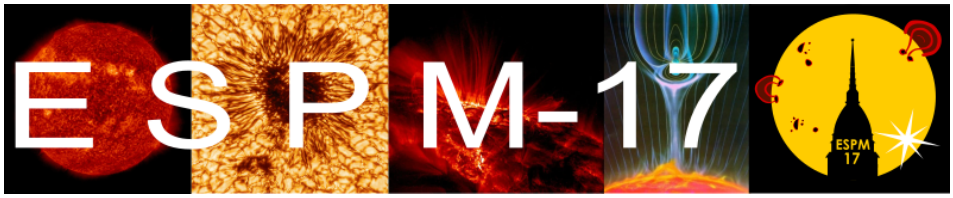

Contribution ID: **187** Type: **Poster**

Benchmarking Solar Simulations: An Analytical Solution for Non-Linear Diffusivity

Numerical simulations have proven invaluable in understanding the physics of the Sun. With increasing computing power available, we launch increasingly complicated multi-physics simulations. Every single physics module requires validation and we must understand the role of each of these physical processes. This work presents an analytical solution for non-linear diffusivity in 1D, 2D, and 3D. We will use it to benchmark the Spitzer conductivity module in the single and multi-fluid radiative MHD codes Bifrost and Ebysus. The solution is based on the self-similar solutions by Pattle, 1959, which required the diffusing quantity to be zero beyond a finite radius. We have surpassed this constraint, allowing for a small non-zero background value. This problem is highly relevant in the Solar atmosphere, where energy released in nanoflares or originating in the hot MK Corona diffuses to the much colder kK Photosphere. Beyond this use, the derivation and argumentation are general and can be applied to other non-linear diffusion problems.

Primary author: Dr FURUSETH, Sondre Vik (Institutt Teoretisk Astrofysikk, Universitetet i Oslo)

Co-authors: CHERRY, George (Institutt Teoretisk Astrofysikk, Universitetet i Oslo); Dr MARTÍNEZ-SYKORA, Juan (Lockheed Martin Solar and Astrophysics Lab, USA and Insitutt Teoretisk Astrofysikk, Universitetet i Oslo)

Session Classification: Coffee break and poster session 2

Track Classification: Diagnostic tools and numerical methods in solar physics