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Exact conservative solutions of fluid models for the scrape-off layer as the ancestors of blobs?

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Exact solutions have been obtained for the conservative part of a standard two-fluid (density plus vorticity) model of the scrape-off layer (SOL) which are of the travelling-wave type and describe transport of large-, machine-scale structures across the plasma cross-section (radially and/or poloidally). These conservative solutions can be of various forms and shapes, either extended or localised, moving either outwards (as actual high-density blobs) or inwards (as plasma holes with densities lower than the backrgound's), being conjectured that they are the ancestors of the propagating coherent structures, known as blobs, often seen in experiments and numerical simulations of SOL turbulence. These solutions have added value *per se*, not only because they are actual solutions of the conservative interchange model of the SOL, but also because they allow some analytical control over numerical implementations of the model as they provide benchmarks, or standards, against which the latter can be verified. In fact, and as it will be shown, they have been used to verify different numerical schemes to solve the equations of SOL turbulence, namely, an explicit 4th order Runge-Kutta and a new semi-implicit method which, contrary to the Runge-Kutta scheme, guarantees stability without the need for very fine meshes and the consequent computational cost. Once confidence has been gained regarding the numerical implementation of the model, non-conservative terms (such as diffusion, sources, and parallel losses) have been added to check what happens to the conservative structures (whether they are merely distorted or end up by disappearing).

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