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# Multi-species Model for study of Ion Plasma Filaments

In future fusion devices, such as the international tokamak ITER, the main fuel will be comprised of a mix of deuterium and
tritium to achieve self sustained fusion reactions for energy production. Additionally, in such a plasma Helium and
radiating impurities are often main components which should be considered as they can cool the plasma. In order to
further the understanding of the effect the plasma mix has on plasma turbulence and
transport it is necessary to be able to model the individual species separately.
We present results on the use of a multi-species model for simulating the influence of
isotopes on plasma transport and turbulence in the edge of closed magnetic field lines and scrape off layer with open magnetic field lines. The model is an extension of a previously developed single ion species model [1].

We examine the influence on multiple species with different mass and charge on the
propagation of seeded density perturbations, known as blobs, as a first application of the enhanced code.
Simulations of seeded blobs show that ions with different isotope mixes can be
sufficiently well described by using an effective mass or charge for ions when the ratio of densities is uniformly distributed.
In general the use of a multi ion species model presents a much more versatile tools as it can
describe systems that are ill suited for effective mass and charge studies such as non-uniform density ratios.

**References**

[1] Madsen, J. et al, Physics of Plasmas 23, 032306 (2016)

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