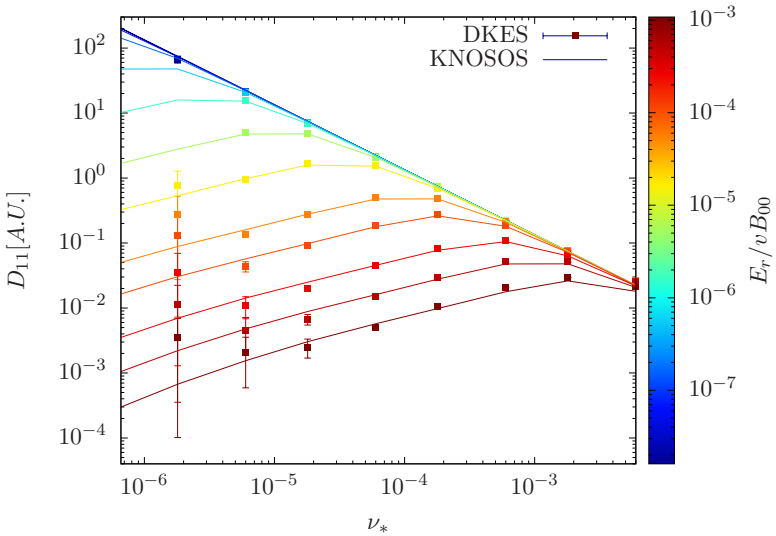
KNOSOS, a fast neoclassical code for three-dimensional magnetic configurations

New version of the code: the bounce-averaged drift kinetic equation implemented is

$$\int_{l_{b_1}}^{l_{b_2}} \frac{\mathrm{d}l}{|v_\parallel|}\left(\mathbf{v}_{M,b}+\frac{B}{\langle B\rangle}\mathbf{v}_E\right)\cdot\nabla\alpha\left(\partial_\alpha+\partial_\alpha\lambda|_J\partial_\lambda\right)g_b-\int_{l_{b_1}}^{l_{b_2}}\frac{\mathrm{d}l}{|v_\parallel|}C_b^{\mathrm{lin}}[g_b]=-\int_{l_{b_1}}^{l_{b_2}}\frac{\mathrm{d}l}{|v_\parallel|}(\mathbf{v}_{M,b}+\mathbf{v}_E)\cdot\nabla\psi\Upsilon_b F_{M,b}\,.$$

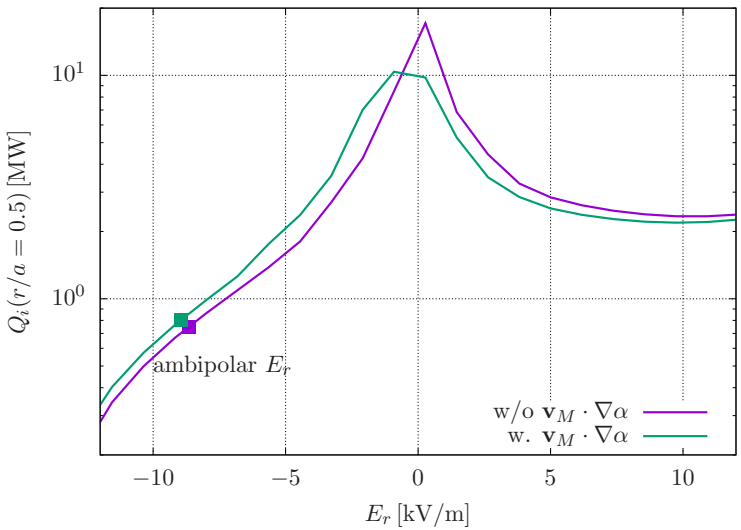
More accurate and/or faster than standard neoclassical codes in two limits:

(1) Large aspect ratio stellarators (and standard values of E_r)



Benchmarked against DKES, orders of magnitude faster ⇒ KNOSOS will be used for stellarator optimization.

(2) Optimized stellarators (relevant when E_r is small)



Tangential magnetic drift needed for correct calculation of energy flux ⇒ KNOSOS will be used for analizing W7-X experiments.

J. L. Velasco *et al.*

Laboratorio Nacional de Fusión Ciemat EUROfusion