

Pfirsch-Schlüter Neoclassical Impurity Transport in a Rotating Plasma

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Abstract. In this work, we extend previous analytic theories for the neoclassical transport of a trace heavy impurity in a rotating plasma in the Pfirsch-Schlüter regime. The complete diffusive and convective components of the ambipolar particle flux are derived. The solution is valid for arbitrary impurity charge and impurity Mach number and for general geometry. Inclusion of finite main ion temperature gradient effects is shown in the small ion Mach number limit. A simple interpolation formula is derived for the case of high impurity charge and circular geometry. While an enhancement of the diffusion coefficient is found for order one impurity Mach number, a reduction due to the rotation-driven poloidal asymmetry in the density occurs for very large Mach number.