

In this work, we attempt to find a three-dimensional solution to the Navier–Stokes equations describing an  $\alpha$ -disk accreting onto a neutron star. The solution for great radial distances is well-known. However, this solution leads to a singularity at the zero-torque radius. A boundary layer arises in the neighbourhood of this radius since the solution for great radial distances cannot fulfil the inner boundary condition, therefore it stops being valid. Mathematically we are dealing with singular perturbations. In order to eliminate this singularity, we will use the method of matched asymptotic expansions, which leads to new equations of motion. First, we review known results, then we provide arguments for rescaling the equations of motion, and we attempt to solve the rescaled equations.