

Boundary layer on the surface of a neutron star

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In an attempt to model the accretion onto a neutron star in low-mass X-ray binaries, we present two-dimensional hydrodynamical models of the gas flow in a close vicinity of the stellar surface. First we consider the case in which a gas pressure dominates, assuming that the star is non-rotating. For the stellar mass, we take $M_{\text{star}} = 1.4 \times 10^{-2} M_{\odot}$ and for the gas temperature $T = 5 \times 10^6$ K. Our results are qualitatively different in the case of a realistic neutron star mass and a realistic gas temperature of $T \simeq 10^8$ K, when the radiation pressure dominates. We show that to get a stationary solution in the latter case, the star most probably has to rotate with a considerable velocity.