

Time-dependent simulations of the spreading layers and the origin of quasi-period oscillations in accreting weakly-magnetized neutron stars

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Matter accreting on weakly-magnetized neutron stars decelerates from the nearly Keplerian rotation to a slower stellar rotation due to the interaction with the star. The deceleration can happen in the classical boundary layer or in the spreading layer as was recently proposed by Inogamov & Sunyaev (1999). In the spreading layer model it is assumed that the average rotational velocity of gas in the layer at the equator is close to the Keplerian one. In addition, the set of equations allows, as usual, various solutions and the specific steady-state solution is chosen from that set. We performed time-dependent simulations of the spreading layer and showed that the actual solution the systems approach is very far from the Inogamov & Sunyaev (1999) solution. We obtain solutions for various accretion rates and rotational velocities of the star. We also discuss the relation between the rotational rates of the accreting matter and the frequencies of quasi-periodic oscillations observed from accreting weakly-magnetized neutron stars.