Simulations of disk accretion onto magnetic neutron stars

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We discuss our recent 2D and 3D MHD numerical simulations of disk accretion to rotating neutron stars with aligned or misaligned dipole magnetic fields. We focus on the main features observed in these simulations: the structure of the magnetospheric plasma flows for different misalignment angles, the structure of the inner regions of the disk, evolution of the magnetic field lines, the properties of the hot spots at the surface of the star, and the spin history of the star. We will show results for the rotational equilibrium state, at which rotational torque is zero on average, and which is the most probable state in most of accreting systems. We also describe the propeller stage, where the star spins-down rapidly and may produce powerful outflows. We discuss different variability and quasi-periodic variability features which result from the disk-magnetosphere interaction.