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Spin in binary neutron star initial data ANTONIOS TSOKAROS, Univ of Illinois - Urbana, KOJI URYU, University of the Ryukyus, Japan, MILTON RUIZ, STUART SHAPIRO, Univ of Illinois - Urbana — The rotation of a single star can be described by different quantities such as the angular momentum, the angular velocity, the dimensionless spin parameter, the quasi-local spin, as well as the circulation. For single, slowly rotating stars curves of mass versus density at constant quasi-local spin almost coincide (up to a constant) with curves at constant circulation. For highly spinning stars this is no longer true. Since for isentropic fluids dynamical evolution conserves the baryon mass, entropy, and circulation, we propose the use of circulation in order to parametrize the spin in binary neutron stars. We present the first constant circulation sequences of a binary system at different separations using a piecewise polytropic equation of state. We show that, at least for slowly rotating stars, the quasi-local spin is also approximately conserved along the sequence similarly to single rotating stars. We also present a new decomposition for the fluid velocity in the spinning formulation that simplifies the equations and makes the identification of the spin with the circulation of single stars closer.

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