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Helical coordinate systems for SHAx RFP states BARBARA MOMO, EMILIO MARTINES, Consorzio RFX, Associazione EURATOM-ENEA sulla Fusione, Padova, Italy, DOMINIQUE FRANCK ESCANDE, UMR 6633 CNRS-Universite de Provence, Marseille, France, FULVIO AURIEMMA, ALESSANDRO FASSINA, PAOLO INNOCENTE, RITA LORENZINI, DAVID TERRANOVA, PAOLO ZANCA, Consorzio RFX, Associazione EURATOM-ENEA sulla Fusione, Padova, Italy — SHAx states are the helical RFP states, characterized by the dominance of the $(m,n)=(1,7)$ mode and the presence of some residual ‘secondary’ modes in the MHD spectrum, that have been observed at high plasma current in the RFX-mod device. New helical coordinate systems are defined in the SHEq code, where SHAx states are modeled as pure Single Helicity (SH) states. The helical flux is a good flux function, and is therefore used as the ‘radial’ coordinate. The goal is to find straight-field-line coordinates, with angles defined w.r.t the helical axis, in a toroidal geometry: it is done beginning from the canonical form of the magnetic field and computing a transformation to action-angle coordinates. This enables to compute the helical safety factor related to helical equilibria. From the experimental point of view, this can be used for helical MHD spectra analysis and better understanding of experimental observations like transport barriers usually associated to SHAx states.

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