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QUASI-ISODYNAMIC STELLARATORS WITH A COMPLEX PERIOD STRUCTURE AND A REDUCED ASPECT RATIO *)

[1]Khanaeva R., [2]Mikhailov M.

[1]*Moscow Institute of Physics and Technology, Dolgoprudny, Russian Federation,* zasshu@yandex.ru

[2]*Scientific Research Center "Kurchatov Institute", Moscow, Russian Federation,* mikhaylov_mi@nrcki.ru

Quasi-isodynamic for all reflected particles stellarators with a simple period structure were considered earlier for various values of the number of periods (f.e., [1] (N=6), [2] (N=2), [3] (N=12). In quasi-isodynamic stellarators, the topology of *B*=const lines on magnetic surfaces is determined by the presence of the bumpy component. The curvature of the magnetic axis in the cross-sections with extremums of the longitudinal field turns to zero. Every period between two neighbor maximums of *B* becomes a CREL [4], so that the secondary current is closed within each plasma period, which already leads to its significant decrease. However, within the period, the dipole current on both the inner and outer parts does not change sign, turning to zero in cross-sections with maxima of the magnetic field modulus and having opposite directions on the inner and outer parts. Further reduction of the secondary current can be achieved by complicating the structure of the period so that the secondary current is alternating both on the internal and external workaround of the torus. Previously, the possibility of the existence of such configurations was shown in [5], [6] for a six-period configuration with a large aspect ratio, A ~30. The properties of the configurations were considered at $<\beta> \sim 0.2$. In this paper, we study the possibilities of fulfilling the quasi-isodynamicity condition in two types of configurations with a complex period structure for a reduced number of periods, and, accordingly, a reduced aspect ratio. In configurations of both types, the curvature of the magnetic axis changes sign on the period. First type stellarators have one maximum and one minimum of the longitudinal field on the period, while configurations of the second type have two maxima and two minima. We showed that those found configurations are stable with respect to local modes and have acceptably small values of effective ripples and the geometric factor of bootstrap current. We present data for a five-period configuration with A ~20 and $<\beta> \sim 0.2$.

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