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Essential Tokamak Geometric Effects for Global Ballooning Mode Studies HUASHENG XIE, YONG XIAO, IFTS, Zhejiang University, China — Although often used to study the turbulent transport in finite beta Tokamak plasma, the analytical equilibrium usually implemented in the gyrokinetic simulation would be inadequate in either describing the essential physics or quantitatively comparing with analytical theory. By revisiting the Grad-Shafranov equation and local s-alpha model, we find the usually used concentric or shifted-circle equilibrium is not enough for studying the global behavior of the finite beta fusion plasmas, for example, it may miss the second unstable region or give incorrect growth rate. The essential global shifted-circle geometry for studying finite-beta modes is discussed and verified. This semi-analytical equilibrium is also implemented in gyrokinetic particle code (GTC) and benchmarked for ideal ballooning mode. In addition, preliminary results on kinetic ballooning mode will be presented.

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