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Island induced bootstrap current on island dynamics in tokamaks[1] I.S. LAND, K.C. SHAING, University of Wisconsin — When a magnetic island is imbedded in toroidally symmetric tokamaks, the toroidal symmetry in $|\boldsymbol{B}|$ is broken. Here, $\boldsymbol{B}$ is the magnetic field. This broken symmetry induces an additional bootstrap current density in the vicinity of the island. It is illustrated that this island induced bootstrap current density modifies the island evolution equation and imposes a lower limit on the absolute value of the tearing mode stability parameter | | for the island to be unstable. This lower limit depends on the local poloidal plasma beta, the ratio of the plasma pressure to the poloidal magnetic field pressure. If is high enough, the magnetic island is stable or, in other words, self-healing. The theory provides an explanation as to why an $m = 2$ island is not as commonly observed as m =3, 4, or 5 island in tokamaks. Here, m is the poloidal mode number. This mechanism also indicates an alternative route to stabilize the island in the long mean-free-path regime.

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