

Transport theory for energetic alpha particles and superbananas in tokamak fusion reactors with broken symmetry*

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1. Theory for superbananas in finite aspect ratio tokamaks has been developed. The numerical realization of the superbananas is also accomplished. It is found that the width of the superbananas depends only on the geometry and not on the gyro-radius.
2. Transport theory for energetic alpha particles in the superbanana plateau and superbanana regimes is developed for finite aspect ratio tokamaks. The results can be used to model energetic alpha particle transport in tokamak fusion reactors to determine the critical magnitude of the symmetry breaking magnetic fields that will not significantly impact the fusion energy gain factor Q .