

# Excitation of Beta-Induced Alfvén Eigenmodes by Magnetic Island

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The mechanism of excitation of beta-induced Alfvén eigenmodes (BAEs) with magnetic island larger than a threshold without energetic ions is studied. It is found that the nonlinear coupling between Geodesic acoustic mode and magnetic island can drive the pair of BAEs. To excite the BAEs, the phase of BAEs to island should be  $\pi/2$  and the magnetic island is larger than a threshold. The results are consistent with the experimental results shown in EAST. It implies that other tokamaks similar experimental results, that BAEs excitation by magnetic island without energetic ions, may be from the nonlinear coupling between island and waves. It also implies that the exist of magnetic island can make the excitation of BAEs more easier in plasma with energetic ions, since magnetic island also can increase the pressure gradient of energetic ions near the island separatrix. This predicts that BAEs may appear more frequently in the presence of magnetic island in ITER.

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