# Helicity Injection modeling for Steady State Toroidal Plasmas

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Toroidal magnetic confinement systems, like tokamaks, require current drive inside the plasma to maintain the poloidal magnetic field produced by internal toroidal plasma current. Steady state confinements must be maintained after eliminating the transformer as the current drive mechanism. The steady inductive helicity injection method, as applied to the spheromak HIT-SI [1], is modeled in this work with a simple "wire-model" [2]. First we present calculations regarding the spectrum of shear-Alfvén waves and drift waves [3], focusing on radial positions that produce 20kHz oscillations as observed in HIT-SI discharges. Secondly, we construct a "bow-tie" topology for the confinement chamber, and regular flux surfaces generated by three wires, where one of them is related to the toroidal plasma current. Finally, we add a perturbation in our model to design two semi-circular tubes used to launch plasma flux ropes into the confinement chamber.

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