

Electron-inertia Effects on Driven Magnetic Field Reconnection

B.K. Shivamoggi and N. Al-Salti
University of Central Florida
Orlando, Florida

Electron-inertia effects on the magnetic field reconnection induced by perturbing the boundaries of a slab of plasma with a magnetic neutral surface inside are considered. Energetics of the tearing-mode dynamics with electron inertia which controls the linearized collisionless MHD are considered with a view to clarify the role of the plasma pressure in this process. Cases with the boundaries perturbed at rates slow or fast compared with the hydromagnetic evolution rate are considered separately. When the boundaries are perturbed at a rate slow compared with the hydromagnetic evolution rate and fast compared with the resistive diffusion rate a current sheet forms at the magnetic neutral surface which then disappears via exponential damping and diffusion and reconnection takes place. On the other hand, when the boundaries are perturbed at a rate fast compared with the hydromagnetic evolution rate, there is no time for the current sheet formation and reconnection to take place.¹

¹N. Al-Salti and B. K. Shivamoggi: *Phys. Plasmas* **10**, 4271 (2003).