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The role of current sheet formation in driven plasmoid reconnection in laser-produced plasma bubbles KIRILL LEZHNIN, Princeton University, WILLIAM FOX, AMITAVA BHATTACHARJEE, Princeton Plasma Physics Laboratory — We conduct a multiparametric study of driven magnetic reconnection relevant to recent experiments on colliding magnetized laser produced plasmas using the PIC code PSC. Varying the background plasma density, plasma resistivity, and plasma bubble geometry, the results demonstrate a variety of reconnection behavior and show the coupling between magnetic reconnection and global fluid evolution of the system. We consider both collision of two radially expanding bubbles where reconnection is driven through an X-point, and collision of two parallel fields where reconnection must be initiated by the tearing instability. Under various conditions, we observe transitions between fast, collisionless reconnection to a Sweet-Parker-like slow reconnection to complete stalling of the reconnection. By varying plasma resistivity, we observe the transition between fast and slow reconnection at Lundquist number $S \approx 10^3$. The transition from plasmoid reconnection to a single X-point reconnection also happens around $S \approx 10^3$. We find that the criterion $\delta/d_i < 1$ is necessary for fast reconnection onset. Finally, at sufficiently high background density, magnetic reconnection can be suppressed, leading to bouncing motion of the magnetized plasma bubbles.

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