

Abstract Submitted
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Effect of external forcing on the coupled state of two inductively coupled glow discharge plasma sources NEERAJ CHAUBEY, SUBROTO MUKHERJEE, ABHIJIT SEN, Inst for Plasm Res — The effect of an external forcing on the in-phase synchronized state of the anode glow oscillations of two inductively coupled glow discharge plasma sources is studied. The parameters of the two plasma sources are initially so adjusted that their anode glow oscillations achieve an in-phase synchronized state with an entrained frequency of 110 kHz. The system is then subjected to an external harmonic forcing from a function generator. It is observed that for a low amplitude forcing (500 mVpp to 800 mVpp) and with a progressive increase in the frequency of the driver from 105 kHz to 112 kHz, the in-phase state changes successively to an anti-phase low frequency state (105 - 108) kHz, to a frequency pulling state (108 - 109 kHz) and finally to an in-phase high frequency state (109 - 112) kHz. When the forcing signal is of a high amplitude (> 800mVpp) the transition from an anti-phase state (105 - 109) kHz to an in-phase state (109 -112) kHz is seen to occur without any intermediate frequency pulling state. These experimental observations are well reproduced in numerical solutions of a theoretical model consisting of two Van der Pol oscillators that are environmentally coupled to each other with one of them driven by an external oscillatory source.

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