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Contribution ID: **38** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Dissipative coupling in a classical system

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We experimentally demonstrate dissipative in a double pendulum system. Unlike the well-known spring coupled pendulum experiment, our experiment replaces the spring with the dissipative coupling device. Two pendulums are coupled by a device that employs Lenz's effect to dissipate energy through electromagnetic friction. To observe the influence of the dissipative coupling, we tune the natural frequency differences between two pendulums and observe the response of the system. This experiment contains both time and frequency domain results as well as additional relative phase analysis. Our work provides evidence of the dominant linear synchronization phenomenon. Synchronization arises from the dissipative coupling as it tends to re-establish the system's degeneracy. While the coherent coupling (spring coupled pendulums) tends to break the system degeneracy. Our work also reveals the previously unstudied time-domain dynamics of two dissipative coupled pendulums. The study of the phase evolution of a dissipative coupling process could also deepen our understanding of synchronization. More importantly, this experiment is valuable for entry-level physics education. The dissipative coupling device is easy to manufacture, is budget-friendly, and the theoretical calculations are also suitable for the undergraduate level. Our experiment can serve as an excellent classical mechanics demonstration example.

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