

Phase locking and pattern formation in tandem fish swimming

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Abstract. Red nose tetra fish *Hemigrammus bleheri* swimming against a steady stream in channel flow are shown to synchronise when swimming in pairs. The synchronization is here characterized by either in-phase or out of phase swimming modes. The experiments were performed with seven different pairs of fishes. We analyze precisely the synchronisation as a function of the swimming parameters using a statistical approach based on the complete time-dependent kinematics of each fish. After showing that the synchronization between two fishes strongly depends upon swimming velocity, we give some elements about the understanding of collective swimming.