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Schooling of self-propelled flexible fins[1] SUNG GOON PARK, HYUNG JIN SUNG, Korea Adv Inst of Sci Tech (KAIST) — A fish can gain hydrodynamic advantages from being a member of a school. Inspired by fish schooling in nature, a two-dimensional simulation was performed for self-propelled flexible fins in four configurations; tandem, diagonal, triangular, and diamond configurations. The flow-mediated interactions between the flexible fins were considered by using an immersed boundary method. A heaving motion was prescribed on the leading, and other posterior parts passively fluttered. In the present self-propelled system, the schooling structures were dynamically determined, and the stable configurations were spontaneously formed and maintained purely by the hydrodynamic interactions. The swimming speed of the schooling fins was almost the same to the isolated fin. The input power was largely dependent on the schooling structure and the local positioning of the members within the structure. The input powers of the following fin in the stable tandem and diagonal configurations are lower by 14% and 6% respectively than that of the leading fin. The fins swimming in the second row in the triangular or diamond configuration experienced an increased input power by 5% than the leading fin. The following fin in the diamond configuration reduced the input power by 23% than the leading fin.

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