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Attraction and repulsion between two large particles in a granular flow. NATHALIE FRAYSSE, Univ. Cote d'Azur, CNRS, INPHYNI, Nice, France, UMBERTO D'ORTONA, Aix-Marseille Univ., CNRS Centrale Marseille, M2P2, Marseille, France, NATHALIE THOMAS, Aix-Marseille Univ., CNRS, IUSTI, Marseille, France — The interaction between particles immersed in a fluid has been studied for long. Its rich phenomenology includes for example the drafting-kissing-tumbling behavior. For non-Newtonian fluids, other complex phenomena occur like oblique settling of two particles or locking at a defined distance. In a granular flow made of small particles (diameter d), a few large particles (diameter D), or intruders, locate near the bottom of the flow for D/d >5 (Thomas PRE 2000). Here we present a DEM study of the interaction between two large intruders flowing near the bottom of a granular flow down an incline. Initially, the intruders (D=10d) are placed obliquely at a distance 2D in flows of increasing thickness H=7d up to 30d. In some simulations, two perpendicular virtual springs are also added between the intruders to measure the interaction forces. For all thicknesses, intruders align with the flow. A transition occurs between thin flows H<8d where intruders attract each other and are almost in contact, an intermediate regime 9d<H<16d where they lock on at a specific distance that increases with H, and thick flows H>16d where intruders repel each other. This transition also depends on D and slightly on the incline slope. When several intruders flow altogether, they organize into trains.

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