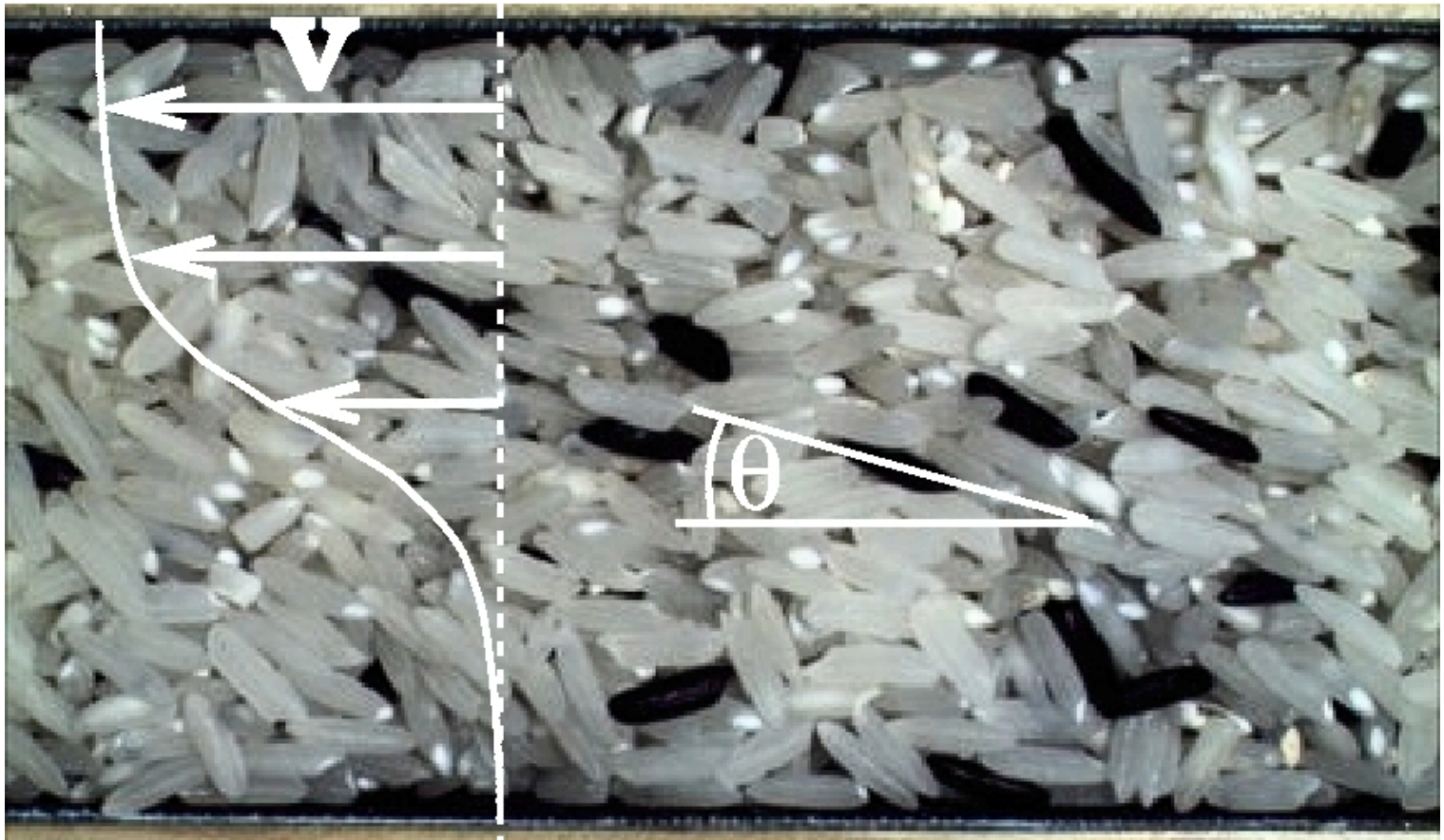


How do densely packed rods align in shear flow?

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Ordering and alignment of elongated objects in shear flows can be observed at all length scales, in log jams on rivers, in seeds, nanorods, viruses, and even at molecular scales in nematic liquid crystals. Such alignment processes are poorly characterized for macroscopic objects, even though granular flows have been extensively studied in the last two decades.

We show that in the steady state the time and ensemble averaged direction of the main axis of the particles encloses a small angle with the streamlines. This shear alignment angle is independent of the applied shear rate, and it decreases with increasing grain aspect ratio. At the grain level the steady state is characterized by a net rotation of the particles, as dictated by the shear flow.

