

ABSTRACT

We present the driving mechanism of gap flow between two stationary side-by-side circular cylinders immersed in the sub-critical Reynolds number regime and its variation with gap spacing, based on steady flow characteristics. A series of experiments and numerical simulations have been performed. Results reveal that gap flow, the flow passing between the cylinders, can be classified broadly into *pressure gradient* and *momentum driven* regime, depending on the spacing ratio (T/D) where T is the transverse center-to-center spacing between the cylinders and D is the cylinder diameter. The pressure gradient driven regime occurs roughly $T/D < 1.25$ where the mean velocity of the gap flow increases as the spacing ratio (T/D) increases. The momentum driven regime follows with a monotonic decrease in the mean velocity as the spacing ratio increases when $T/D > 1.25$. Within the pressure gradient driven regime, the gap flow undergoes transitions resulting from distinct changes in the circumferential static pressure distribution, velocity profile, the transverse pressure gradient and mean velocity at the throat of the two cylinders.