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Area of expertise

Centrifuges with hydraulic drive

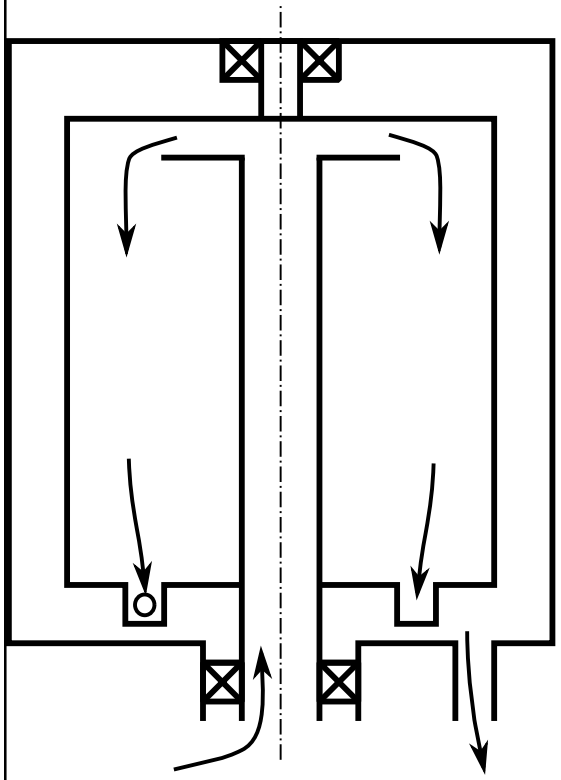

Fig.1

Centrifuges are used for separating solid particles from the fluid of different density, for example for cleaning oil in car engines. High rotation speed of the rotor creates large centrifugal forces, pulling heavier particles to the side of the rotor, where they stay until removed during a regular maintenance, or from where they are removed continuously by a special mechanism. Frequently, the rotor of the centrifuge is driven by a separate electric motor, or by a shaft from the car engine. A sketch of a centrifuge with a hydraulic drive is shown in Fig.1. In such a centrifuge the fluid is pumped into the rotor and exits through the nozzles. The nozzle thrust creates torque driving the centrifuge, thus eliminating the need for a separate motor. Notice the nozzles on the photograph of the centrifuge, Fig.2.

A centrifuge with hydraulic drive is an interesting object from the fluid dynamics point of view. To achieve high efficiency, the hydraulic resistance of the inner, quickly rotating with the rotor, passages should be minimised. At the same time the fluid should pass through an area far away from the axis of rotation, where the centrifugal force is greater. Nozzle efficiency is crucial. The air in the gap between the rotor and the centrifuge cover also moves, and the air friction makes a significant contribution. Jets from the nozzles might break down into a fine spray and hit the rotor, slowing it down. Optimizing such a device is quite a challenging task, but this can, indeed, be done.

Fig.2

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