

A Ferrofluid Check-valve

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Abstract

A simple design for a ferrofluid check valve (one-way valve) is presented.

1 Introduction

It is relatively easy to make a ferrofluid piston. By making a ferrofluid check valve, it becomes possible to make a pump whose only moving parts are ferrofluid. Such a pump can be used to build a variety of actuators.

2 Principle

The key insight of the ferrofluid check valve is that a bubble inside a a blob of ferrofluid with a magnetic flux gradient will move away from the region of greater magnetic flux toward the region of less magnetic flux. The viscosity and “hardness” of ferrofluid increases with magnetic flux.

Increasing air pressure on a blob of ferrofluid inside a magnetic field tends to push the whole blob.

Because of this fundamental anisotropy, it is possible to create a one-way valve.

If you build a physical structure in which air moving one way pushes the whole blob and moving the other way is injected inside the blob, then you have in theory created a one-way valve.

3 Contact and Getting Involved

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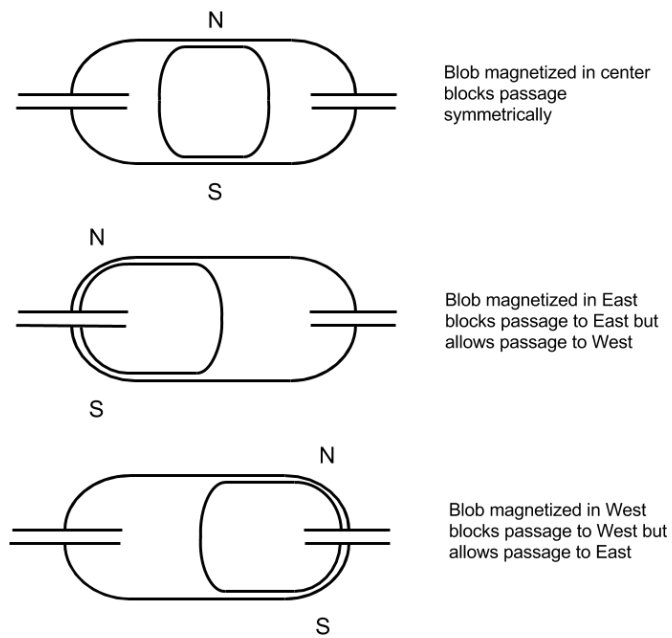


Figure 1: Basic Operation