

Mass-flux-dominant Free-body-diagram

$$\rho_{low} A_{valve} \rightarrow$$

$$\leftarrow \rho_{low} A_{valve}$$

$$\frac{1}{2} C_D \rho (V - \dot{x})^2 A_{valve} \rightarrow$$

$$\leftarrow k_{valve} x$$

$$\rho (V - \dot{x})^2 A_{port} \rightarrow$$

