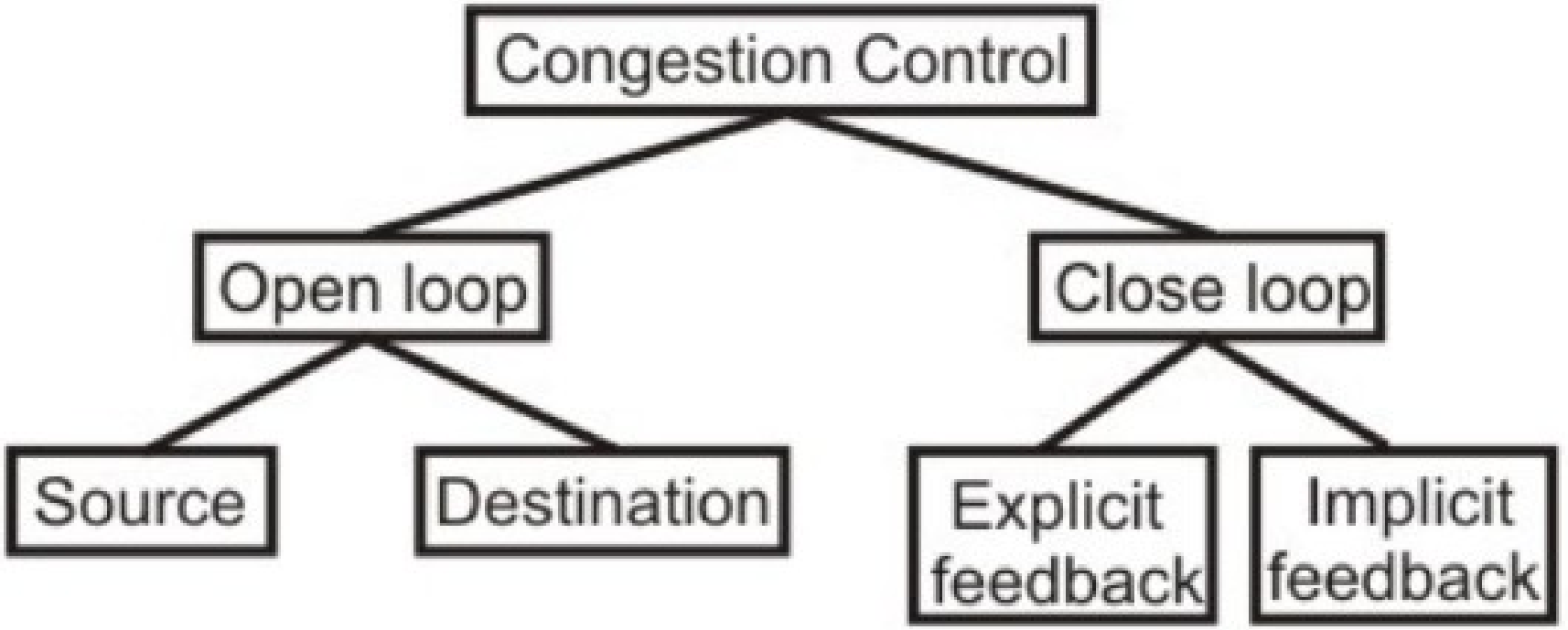
Chapter 7: Congestion Control and Quality of Services

Congestion Control

- Open Loop
- Closed Loop

Congestion Control



Open Loop

- Open loop congestion control is based on prevention of congestion
- It prevents the congestion from happening.
- It do not need end-to-end feedback.
- Open loop control is exercised by using the tools such as deciding when to accept the new packets, when to discard the packets, which packets are to be discarded and making the scheduling decisions at various points
- Open loop: Protocols to prevent or avoid congestion, ensuring that the system (or network under consideration) never enters a Congested State.

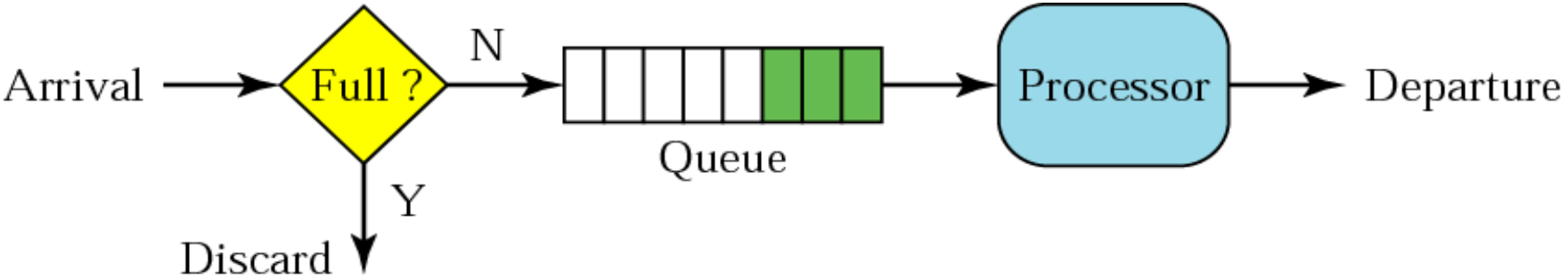
Closed Loop

- Protocols that allow system to enter congested state, detect it, and remove it.
- based on the concept of feedback
- During operation, some system parameters are measured and feed back to portions of the subnet that can take action to reduce the congestion. This approach can be divided into 3 steps:
  - Monitor the system (network) to detect whether the network is congested or not and what's the actual location and devices involved.
  - To pass this information to the places where actions can be taken Adjust the system operation to correct the problem.

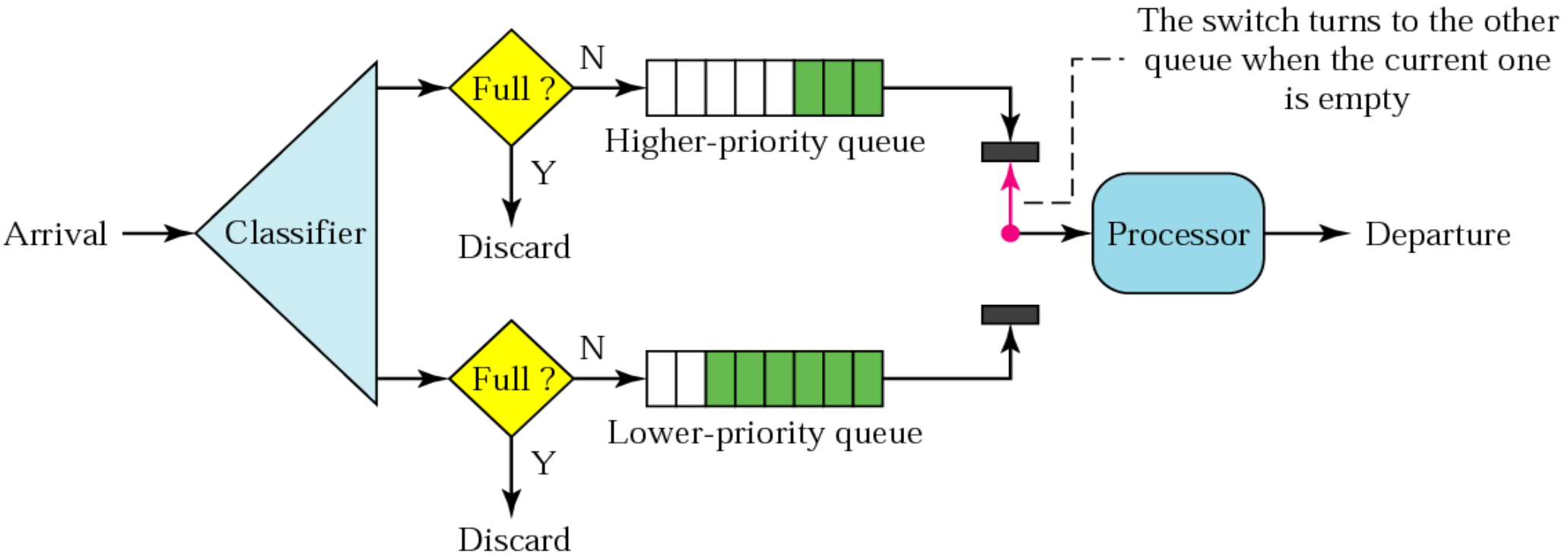
Congestion Control Algorithms

- FIFO Queue
- Priority queuing

FIFO queue



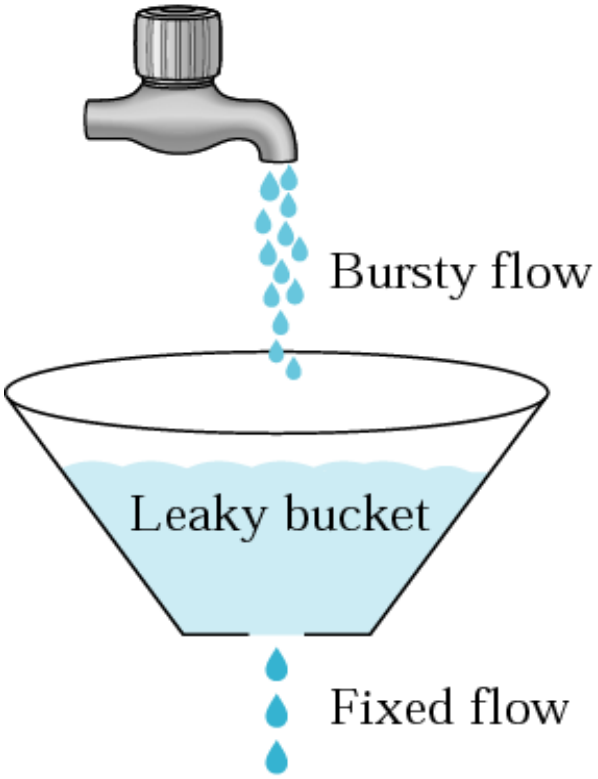
Priority queuing

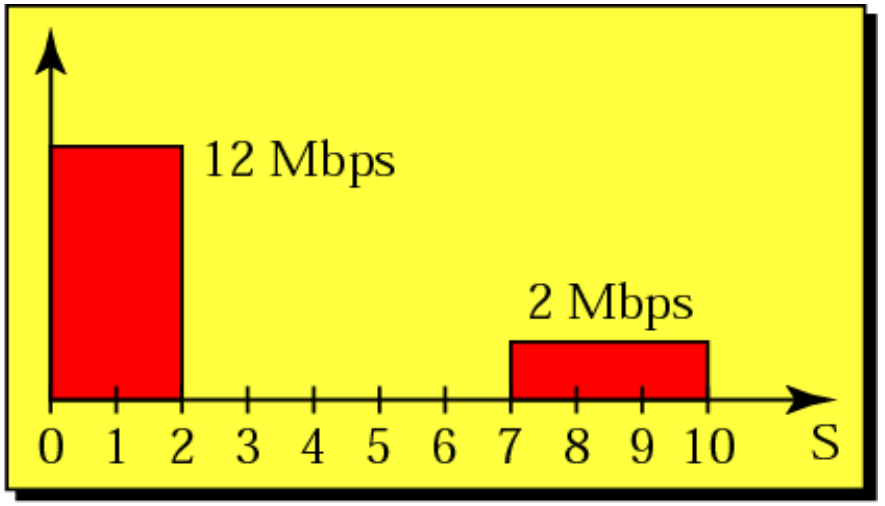


Traffic Shaping Algorithm

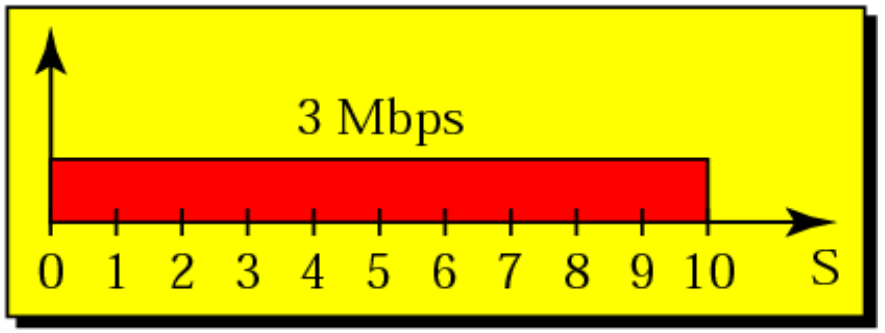
- Leaky Bucket
- Token Bucket

Leaky bucket



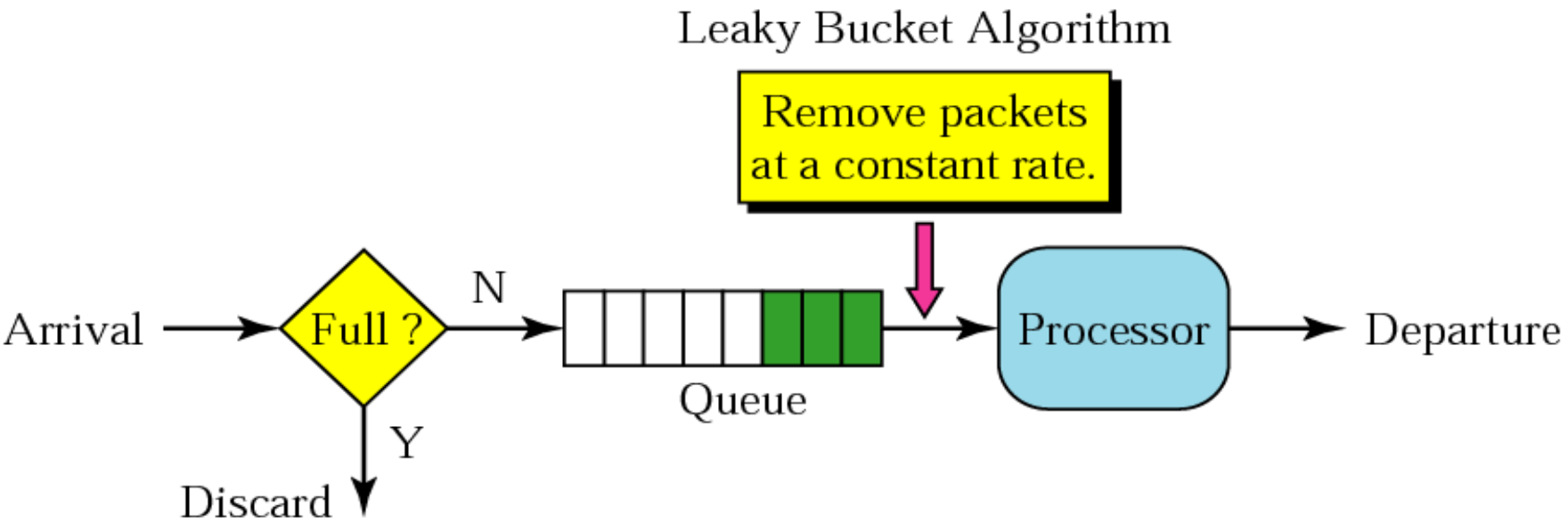


Bursty data



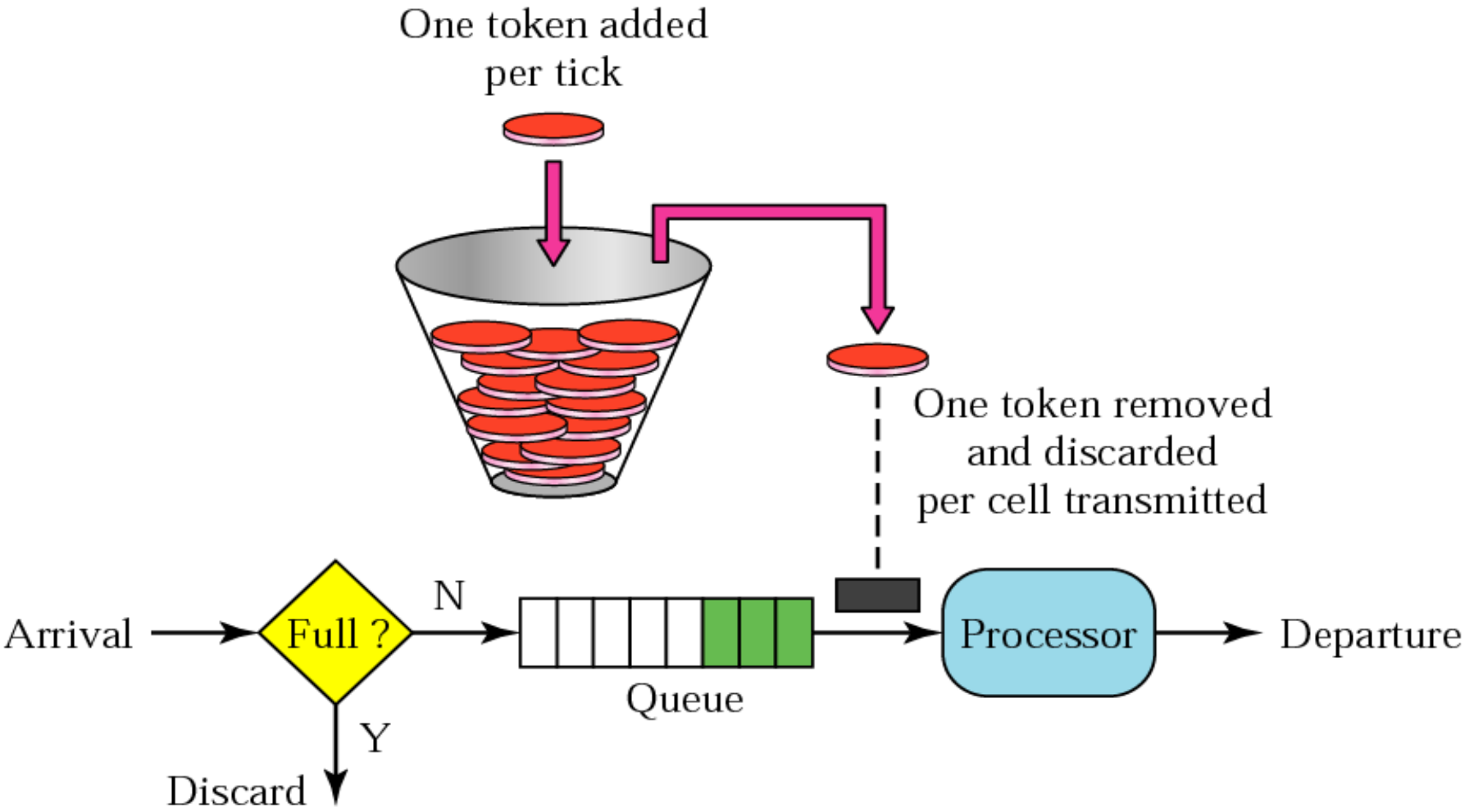
Fixed-rate data

Leaky bucket implementation



A leaky bucket algorithm shapes bursty traffic into fixed-rate traffic by averaging the data rate. It may drop the packets if the bucket is full.

Token bucket



TCP Congestion Control

TCP assumes that the cause of a lost segment is due to congestion in the network.

If the cause of the lost segment is congestion, retransmission of the segment does not remove
the cause—it aggravates it.

Flow characteristics