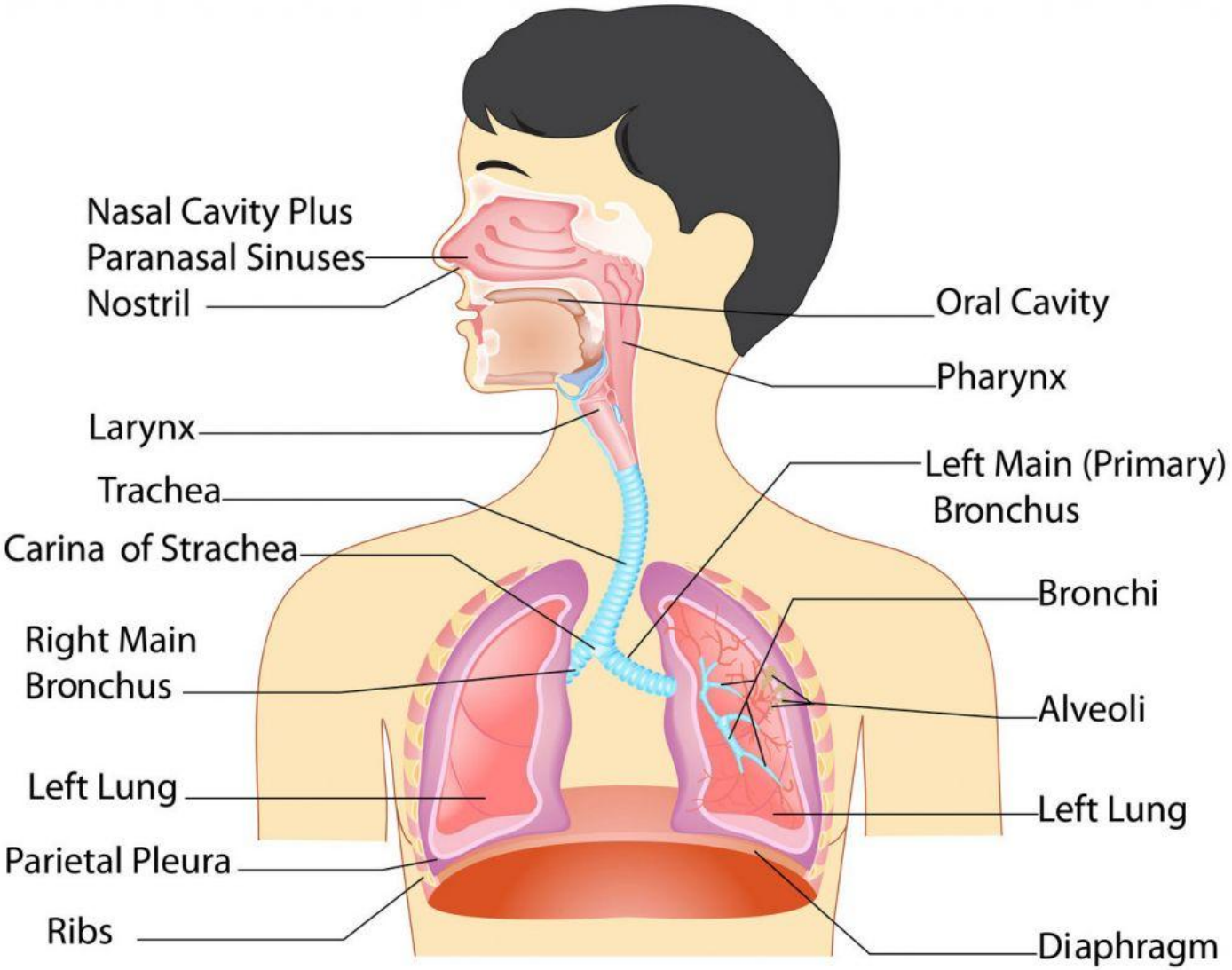
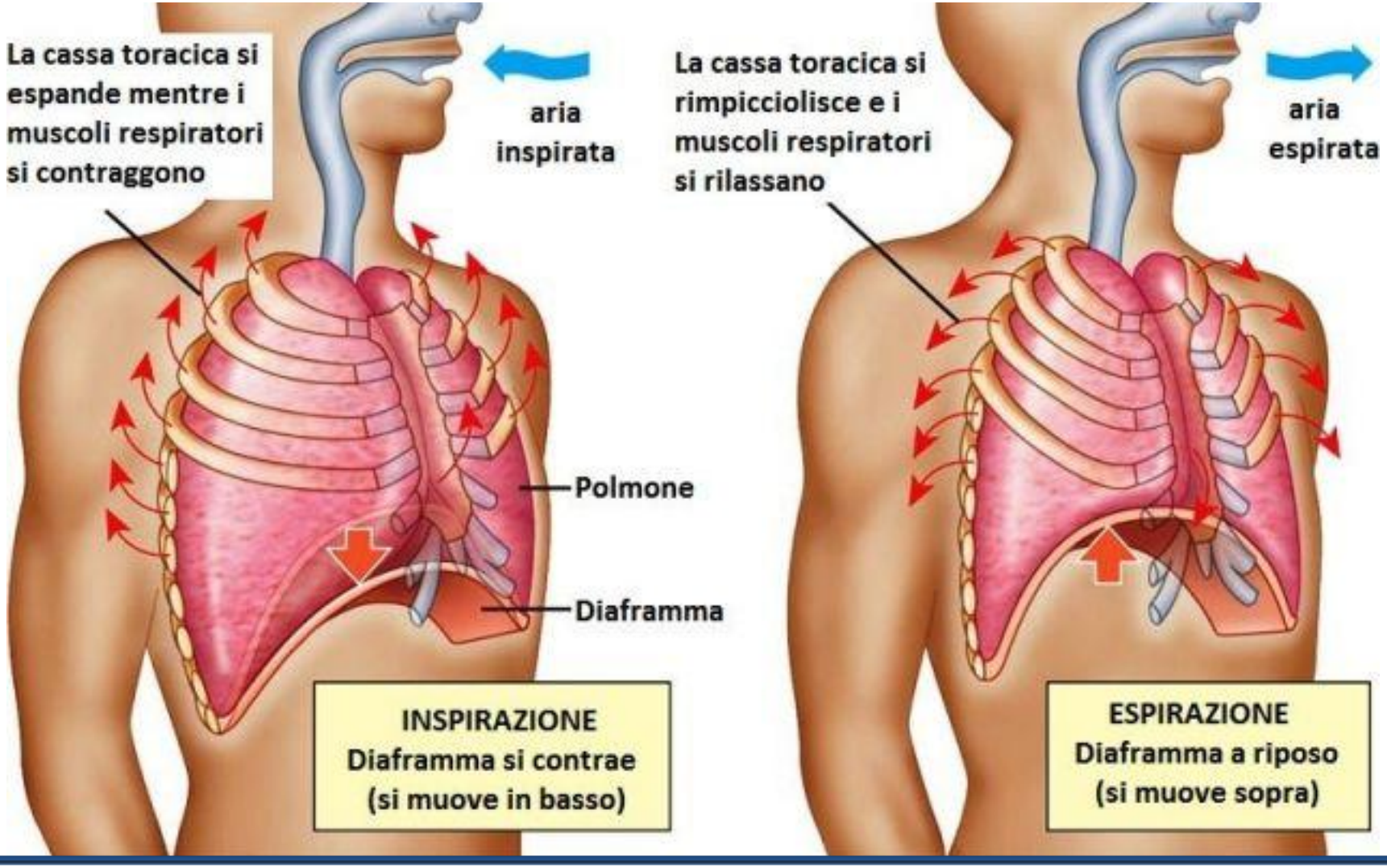
Lung mechanics

Fisiologia



Lung mechanics

Fisiologia



Lung mechanics

STMT

Instrumentation, control, parameter identification, and also lumped parameter models based on electrical analogy

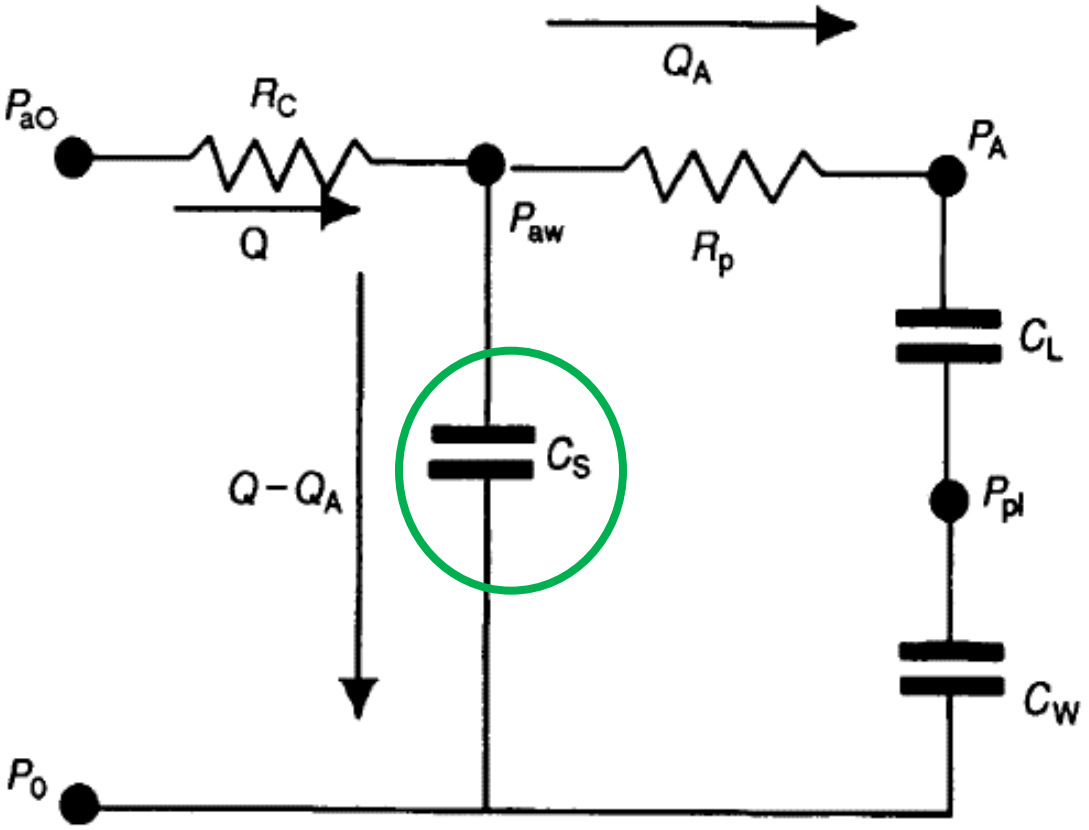
Linearized lung mechanics

M. Khoo
«Physiological
Control Systems»
Sec. 2.3 and 2.9

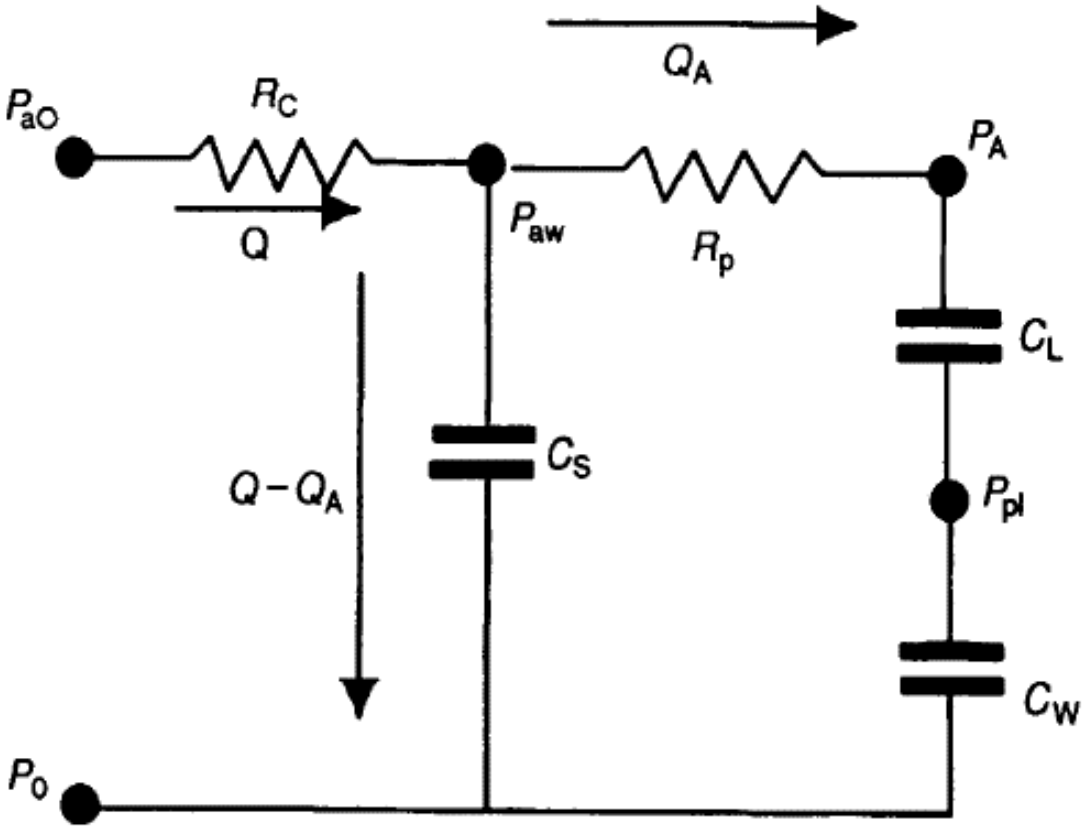
pressione (P) -> potenziale
flusso d'aria (Q) -> corrente
volume d'aria (V=int Q) -> carica

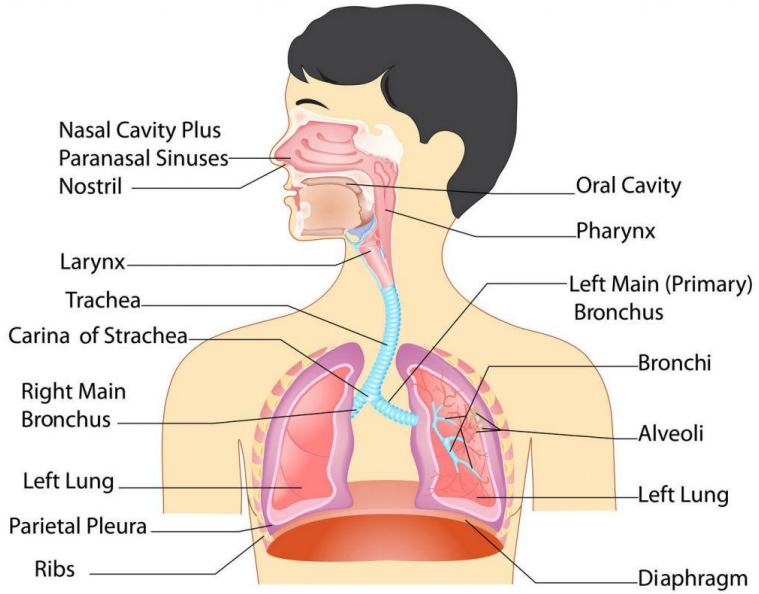
resistenza meccanica = ΔP / Q
compliance = ΔV / ΔP

PaO ↔ Q



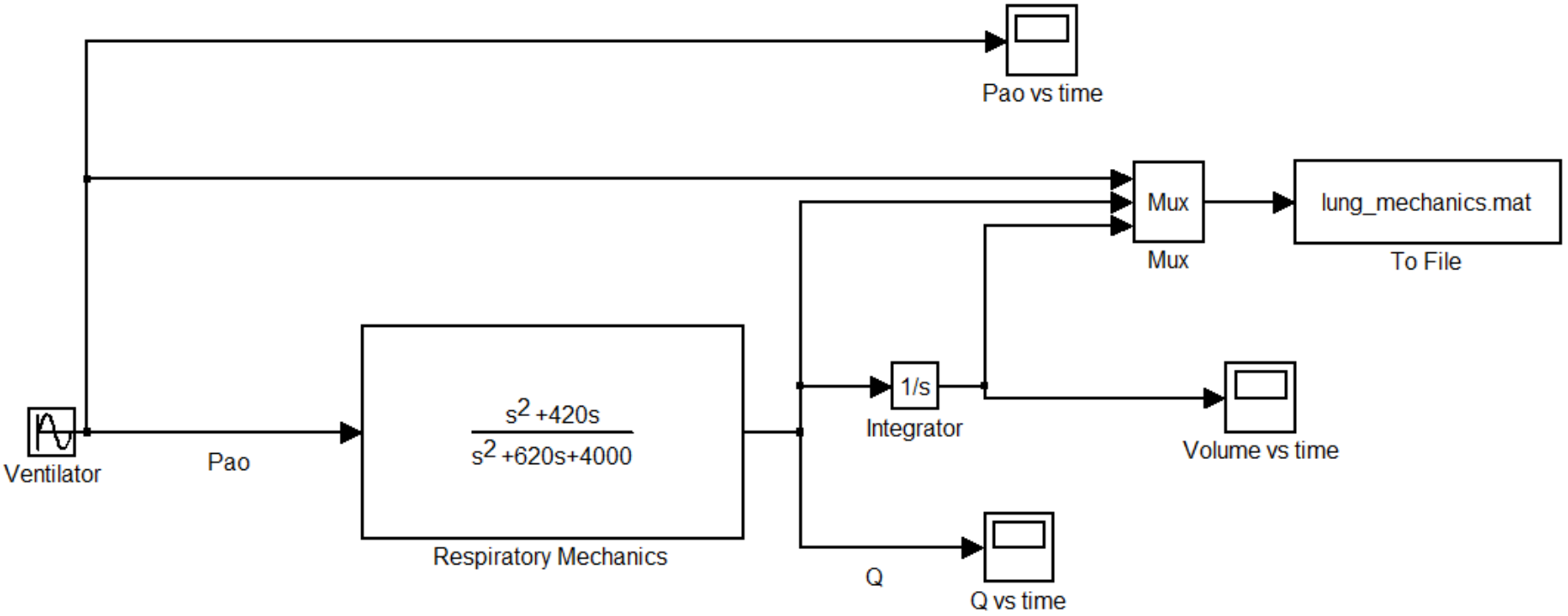
Simple linear model of **respiratory system** (inertia is neglected)


Q_A
P_{aO}
R_C
P_A
Q
P_{aw}
R_p
C_L
C_S
$Q - Q_A$
P_{pl}
C_W
P_0


Nasal Cavity Plus
Paranasal Sinuses
Nostril
Oral Cavity
Pharynx
Larynx
Left Main (Primary)
Bronchus
Trachea
Carina of Strachea
Bronchi
Right Main
Bronchus
Alveoli
Left Lung
Left Lung
Parietal Pleura
Ribs
Diaphragm

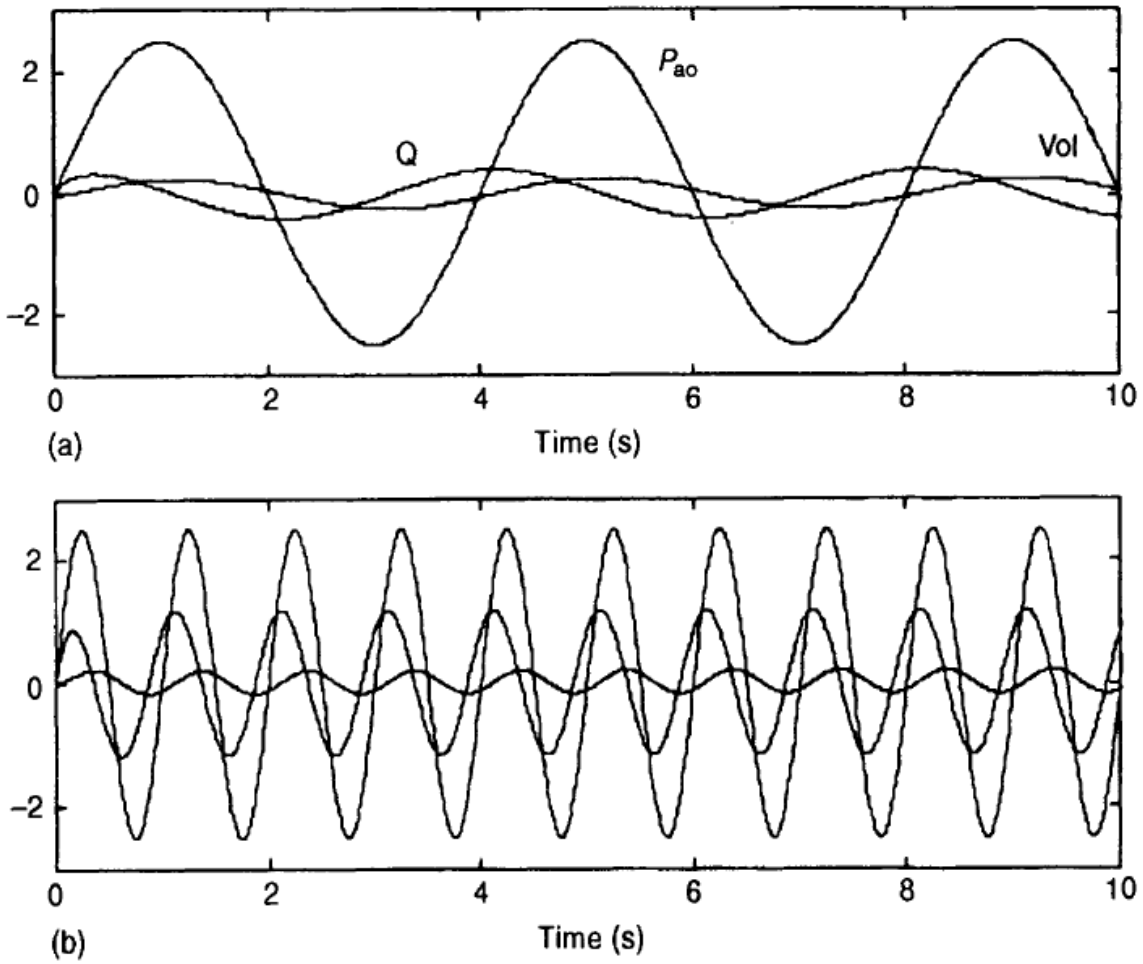
Linearized lung mechanics

Simulink Model



Linearized lung mechanics

Simulink Model

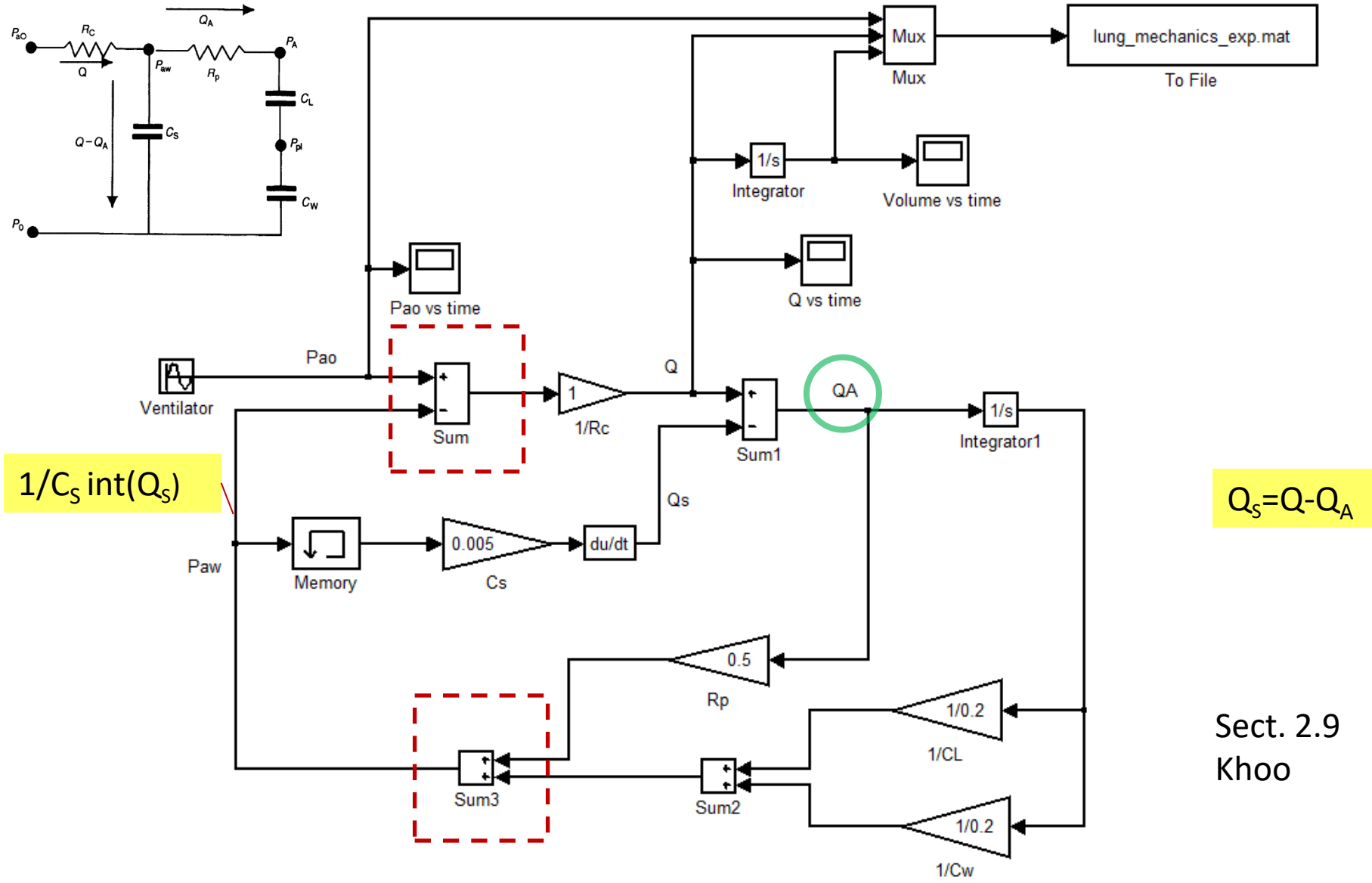


15 breaths/min

60 breaths/min

Figure 2.12 Sample simulation results from SIMULINK implementation of lung mechanics model. (a) Predicted dynamics of airflow, Q, and volume, Vol, in response to sinusoidal forcing of P_{ao} (amplitude = 2.5 cm H_2O) at 15 breaths min^{-1}. (b) Predicted dynamics of Q and Vol in response to sinusoidal forcing of P_{ao} (amplitude = 2.5 cm H_2O) at 60 breaths min^{-1}.

Linearized lung mechanics



Sect. 2.9
Khoo

Linearized lung mechanics

From: *Al Naggar JBSE 2015,* 10.4236/jbise.2015.810068

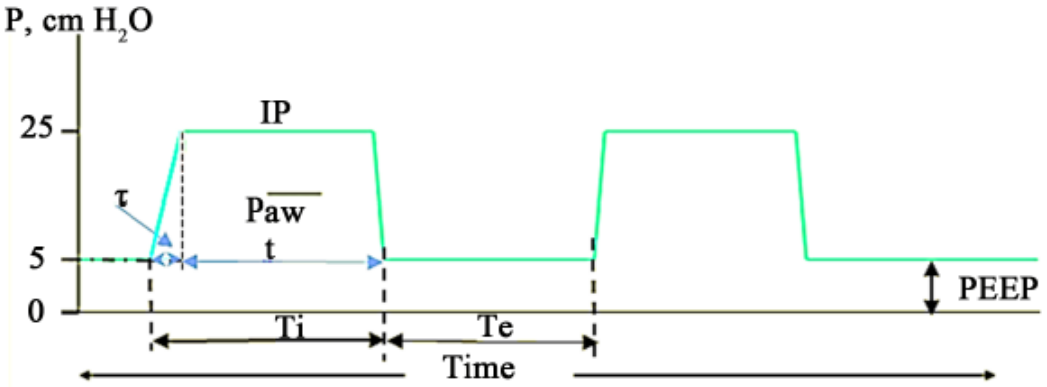


Figure 2. Typical waveform of pressure signal for PCV.

Or take inspiration from STMT - Ventilation