

## Virtual Mechanical Ventilation Protocol - A Model-based Method To determine MV Settings

By: [Arunachalam, GR](#) (Arunachalam, Ganesa Ramachandran) <sup>[1]</sup>; [Chiew, YS](#) (Chiew, Yeong Shiong) <sup>[1]</sup>; [Tan, CP](#) (Tan, Chee Pin) <sup>[1]</sup>; [Ralib, AM](#) (Ralib, Azrina Mohd) <sup>[2]</sup>; [Nor, MBM](#) (Nor, Mohd Basri Mat) <sup>[2]</sup>  
IFAC PAPERSONLINE

Volume: 53 Issue: 2 Page: 16119-16124

DOI: 10.1016/j.ifacol.2020.12.432

Published: 2020

Indexed: 2021-06-23

Document Type: Proceedings Paper

### Conference

Meeting: [21st IFAC World Congress on Automatic Control - Meeting Societal Challenges](#)

Location: ELECTR NETWORK

Date: JUL 11-17, 2020

Sponsors: Int Federat Automat Control; Siemens; Bayer; ABB; MathWorks; Phoenix Contact; Ifak Technol; Berlin Heart; Elsevier; De Gruyter; Tele Medi GmbH

### Abstract

Intensive care mechanical ventilation (MV) therapy is a lifesaving intervention for a patient with respiratory failure. MV supports patients breathing by maintaining positive airway pressure and airflow to the lung. However, there is currently little clinical consensus protocol to set the best MV setting. Hence, it is important to provide an objective and patient-specific MV settings to support patient recovery. This study presents a model-based method to find optimal MV settings using clinical bedside data. A mathematical model of the respiratory system is first used to estimate patient-specific respiratory mechanics. These mechanics are then incorporated with significant clinical findings from the literature to simulate a series of MV settings. The simulation of MV settings is performed using the single compartment lung model using the MATLAB software. From this series of simulated MV settings, optimal MV settings can be determined objectively by the clinician. This model-based method potentially provides decision support for the clinician to set optimal MV settings. Copyright (C) 2020 The Authors.

Free Full Text from Publisher

Export ▾

Add To Marked List

## Citation Network

In Web of Science Core Collection

4

Citations

 Create citation alert

4

Times Cited in All  
Databases

25

Cited References

[View Related Records](#)

+ See more times cited

### You may also like...

Oakes, JM; Roth, SC; Shadden, SC;  
[Airflow Simulations in Infant, Child, and Adult  
Pulmonary Conducting Airways](#)  
ANNALS OF BIOMEDICAL ENGINEERING

Yoshihara, L; Roth, CJ; Wall, WA;  
[Fluid-structure interaction including  
volumetric coupling with homogenised  
subdomains for modeling respiratory  
mechanics](#)

INTERNATIONAL JOURNAL FOR NUMERICAL  
METHODS IN BIOMEDICAL ENGINEERING

Gell, LK; Stadler, DL; Catcheside, PG; et al.  
[Exaggerated ventilatory drive estimates from  
epiglottic and esophageal pressure deflections  
in the presence of airway occlusion](#)  
JOURNAL OF APPLIED PHYSIOLOGY

Rubini, A; Catena, V; Carniel, EL; et al.  
[A REVIEW OF THE EFFECTS OF BODY  
TEMPERATURE VARIATIONS ON RESPIRATORY  
MECHANICS: MEASUREMENTS BY THE END.](#)

## FAILURE

## Author Information

**Corresponding Address** : Arunachalam, Ganesa Ramachandran (corresponding author)

▼ Monash Univ, Sch Engn, Subang Jaya, Malaysia

## Addresses:

▼ <sup>1</sup> Monash Univ, Sch Engn, Subang Jaya, Malaysia

▼ <sup>2</sup> Int Islamic Univ Malaysia, Dept Intens Care, Med Ctr, Kuantan, Malaysia

**E-mail Addresses:** [ganesaramachandran.arunachalam@monash.edu](mailto:ganesaramachandran.arunachalam@monash.edu)

## Categories/Classification

**Research Areas:** Automation & Control Systems

## Funding

## Funding agency

## Grant number

Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC) research grant

IF021911060

Monash University Malaysia Advance Engineering Platform (AEP)

MedTech Centre of Research Expertise, University of Canterbury, New Zealand

Funding Table

[View funding text](#)

## Document Information

**Language:** English

**Accession Number:** WOS:000652593600459

**ISSN:** 2405-8963

## Other Information

**IDS Number:** SF2LV

— [See fewer data fields](#)

## Journal information

IFAC PAPERSONLINE

**ISSN:** 2405-8963

**Current Publisher:** ELSEVIER, RADARWEG 29, 1043 NX AMSTERDAM, NETHERLANDS

**Research Areas:** Automation & Control Systems

**Web of Science Categories:** Automation & Control Systems

[Finite Element Implementation of Biphasic-Fluid Structure Interactions in FEBIO](#)  
JOURNAL OF BIOMECHANICAL ENGINEERING-TRANSACTIONS OF THE ASME

[See all](#)

## Most Recently Cited by

Wong, JW; Chiew, YS; Chase, JG; et al.

[Model-based patient matching for in-parallel pressure-controlled ventilation](#)  
BIOMEDICAL ENGINEERING ONLINE

Lee, JWW; Shah, SSA; Chase, JG; et al.

[Safe Mechanical Ventilation Treatment Settings for Respiratory Failure Patients](#)  
IFAC PAPERSONLINE

[See all](#)

## Use in Web of Science

## Web of Science Usage Count

0

Last 180 Days

0

Since 2013

[Learn more](#)

## This record is from:

## Web of Science Core Collection

- Conference Proceedings Citation Index – Science (CPCI-S)

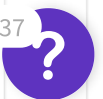
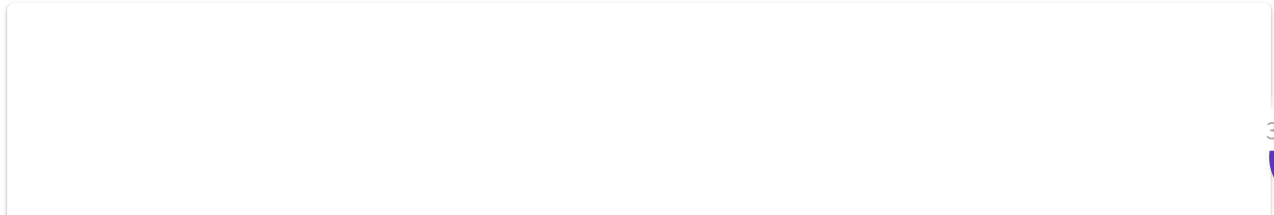
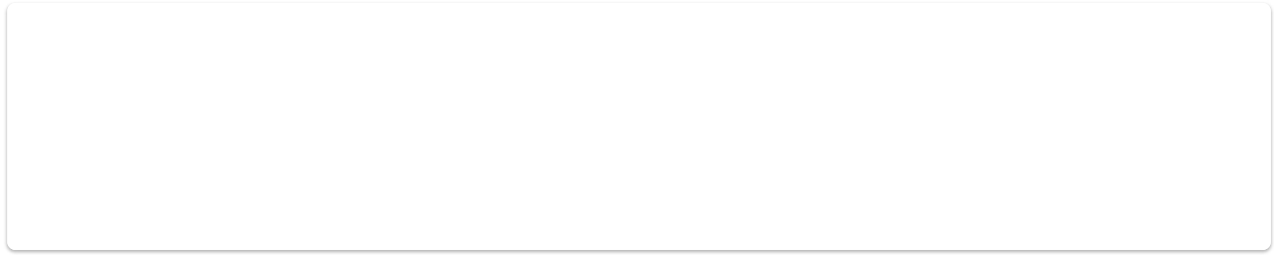
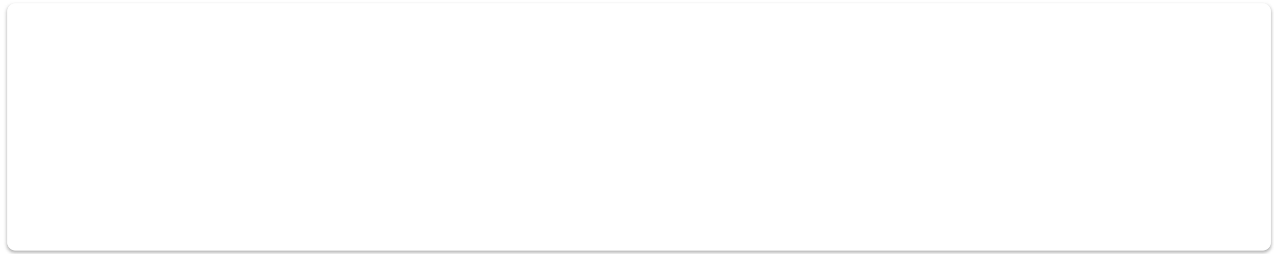
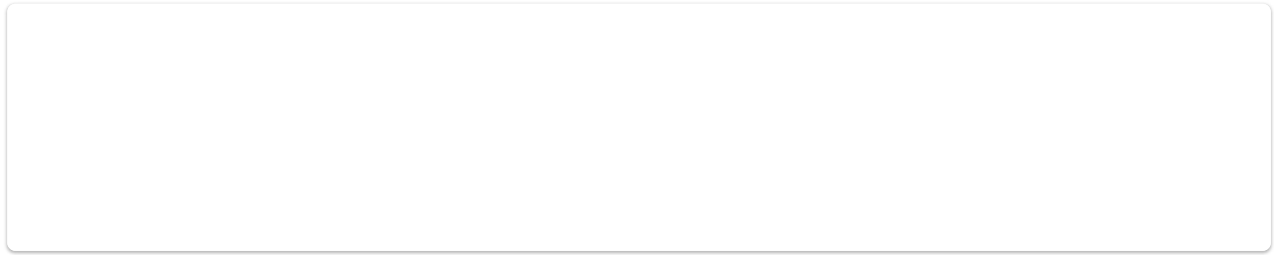
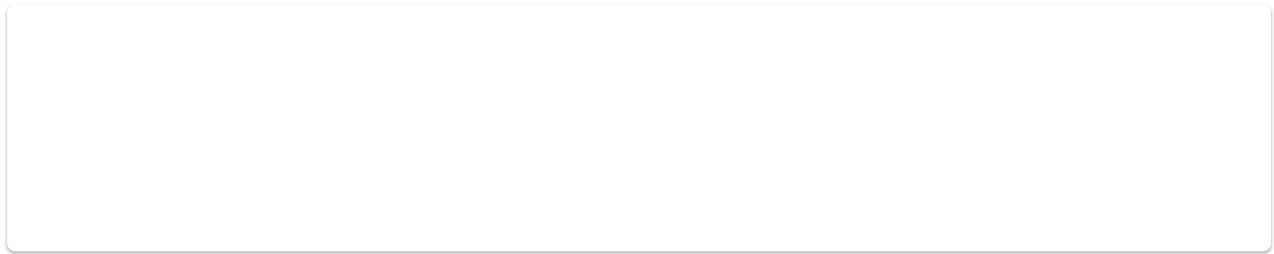
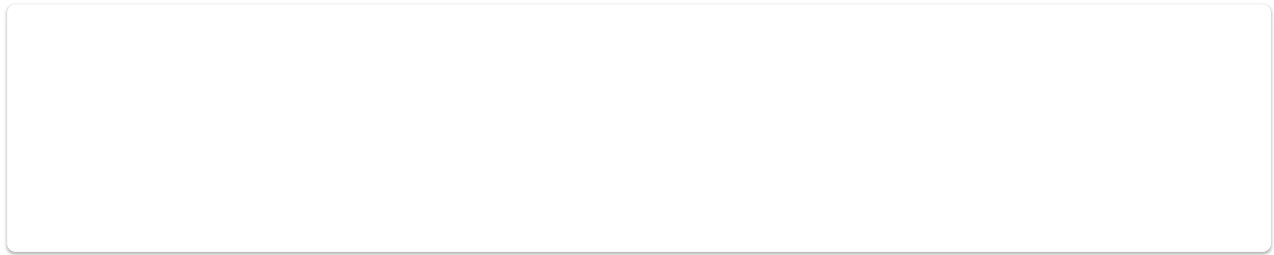
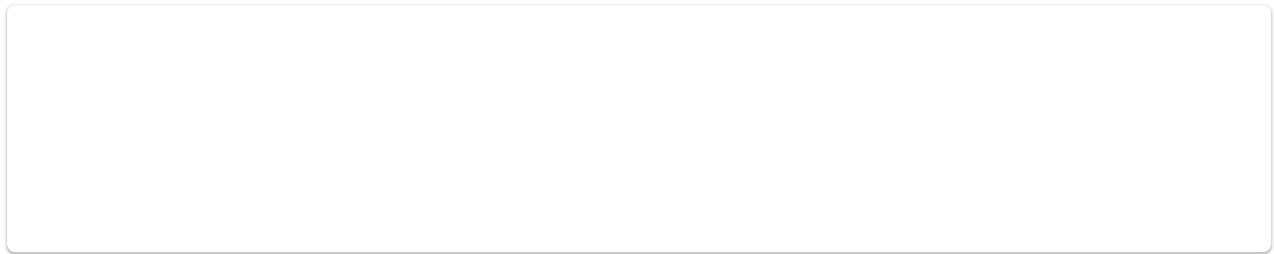
**Suggest a correction**

*If you would like to improve the quality of the data in this record, please [Suggest a correction](#)*

Showing 25 of 25

[View as set of results](#)

*(from Web of Science Core Collection)*



Empty text area for notes or comments.



Four large, empty rectangular boxes stacked vertically, likely for notes or content.

© 2022  
Clarivate  
Training  
Portal  
Product  
Support

Data  
Correction  
Privacy  
Statement  
Newsletter

Copyright  
Notice  
Cookie  
Policy  
Terms of  
Use

Manage  
cookie  
preferences

Follow  
Us  
 