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October 20, 2023

Publications & Conferences

REVIEWED MANUSCRIPTS

Submitted publications

2. *Curvature-induced motion of a thin Bingham layer in airways bifurcations.* C. Karamaoun, H. Kumar, D. Clamond, M. Argentina, B. Mauroy, 2023. Link to the preprint (arxiv)

1. *Water and heat exchanges in mammalian lungs.* B. Haut, C. Karamaoun, B. Mauroy, B. Sobac, 2022. Link to the preprint (arxiv)

Reviewed publications

32. *Economy of organ shapes and function.* C. Goupil, E. Herbert, C. Karamaoun, B. Mauroy et F. Noël. Book chapter in: Economic Principles in Cell Biology (2023). The Economic Cell Collective (doi: 10.5281/zenodo.8156386). Link to the book

31. *Water and heat exchanges in mammalian lungs.* B. Haut, C. Karamaoun, B. Mauroy, B. Sobac. Scientific Reports volume 13, Article number: 6636, 2023 (doi: 10.1038/s41598-023-33052-y). Link to the article

30. *Propagation of an idealized infection in an airway tree, consequences of the inflammation on the oxygen transfer to blood.* F. Noël, B. Mauroy. Journal of Theoretical Biology, vol. 561, p. 111405, Mar. 2023 (doi: 10.1016/j.jtbi.2023.111405). Link to the article

29. *Morphogenesis of Gastrovascular Canal Network in Aurelia Jellyfish: possible mechanisms.* S. Song, S. Zukowski, C. Gambini, P. Dantan, B. Mauroy, S. Douady, A.J.M. Cornelissen, Frontiers in Physics, 2022. Link to the article

28. *Beneficial short-term effect of autogenic drainage on peripheral resistance in childhood cystic fibrosis disease.* P. Bokov, M. Gerardin, G. Brialix, E.D.C. Noble, R. Juif, A.V. Foucher, L.L. Clainche, V. Houdouin, B. Mauroy, C. Delclaux, BMC Pulmonary Medicine, 241, vol. 22, 2022. Link to the article

27. *Determination of a threshold in ventilation for bronchial exercise-induced dehydration.* C. Karamaoun, B. Haut, G. Blain, A. Bernard, F. Daussin, J. Dekerle, V. Bougault*, B. Mauroy*, Journal of Applied Physiology, vol 132 (4) 1031-1040, 2022. (* these authors contributed equally to this work) Link to the article

26. *The origin of the allometric scaling of lung's ventilation in mammals.* F. Noël, C. Karamaoun, J. Dempsey, B. Mauroy, 2020, Peer Community Journal, vol. 2, 2022. Link to the article
Recommended by Peer Community In Math Comp Biol, 2021, link to the PCI MCB recommandation

25. *Optimal efficiency of high frequency chest wall oscillations and links with resistance and compliance in a model of the lung.* M. Brunengo, B. R. Mitchell, A. Nicolini, B. Rousselet, B. Mauroy, 33, 121909, Physics of Fluids, 2021. Link to the article

24. *Spirometry-based airways disease simulation and recognition using Machine Learning approaches.* R. Di Dio, A. Galligo, A. Mantzaflaris, B. Mauroy, LNCS – Lecture Notes in Computer Science, 12931, 2021. Link to the article

23. *Wall shear stress distribution in a compliant airway tree.* J. Stephano and B. Mauroy, Physics Of Fluids, 33, 031907, 2021. Link to the article

22. *Modélisation de l'interaction air/mucus dans l'arbre bronchique. Volume pulmonaire vs débit d'air: contraintes de cisaillement dans l'arbre bronchique.* J.C. Jeulin, C. Fausser, D. Pelca, B. Mauroy. Kinésithérapie, la Revue (20) 228, 2020. Link to the article

21. *Interplay between optimal ventilation and gas transport in a model of the human lung.* F. Noel and B. Mauroy, Frontiers in Physiology 2019 (10). Link to the article

20. *New Insights into the Mechanisms Controlling the Bronchial Mucus Balance.* C. Karamaoun; B. Sobac; B. Mauroy; A. Van Muylem; B. Haut. PLoS ONE 13(6): e0199319. Link to the article

19. *Tissue growth pressure drives early blood flow in the chicken yolk sac.* R. Clément, B. Mauroy, A. Cornelissen. Developmental Dynamics, 246(8), 2017. Link to the article

18. *Deformability-Based Electrokinetic Particle Separation*, T. Zhou, L-H Yeh, F-C Li, B. Mauroy and S. W. Joo. Micromachines 2016, 7(9), 170; doi: 10.3390/mi7090170 Link to the article

17. *A multiscale model of placental oxygen exchange: The effect of villous tree structure on exchange efficiency*, M. Lin, B. Mauroy, J.L. James, M.H. Tawhai, A.R. Clark. Journal of Theoretical Biology, 408, pp. 1-12, 2016. Link to the article

16. *Murray's law revisited with Quémada's fluids and fractal trees*, B. Moreau, B. Mauroy. Journal of Rheology, 59, 1419, 2015. Link to the article

15. *Towards the modeling of mucus draining from human lung : role of airways deformation on air-mucus interaction.* B. Mauroy, P. Flaud, D. Pelca, C. Fausser, J. Merckx, B. R. Mitchell. Frontiers in Physiology, 6:214, 2015. Link to the article

14. *An archetypal mechanism for branching organogenesis*, R. Clément and B. Mauroy. Phys. Biol. 11 016003, 2014. Link to the article

13. *Homothety ratio of airway diameters and site of airway resistance in healthy and COPD subjects*, P. Bokov, B. Mauroy, B. Mahut, C. Delclaux and P. Flaud, Respiratory Physiology & Neurobiology, 191, 2014, pp 38–43. Link to the article

12. *Branching geometry induced by lung self-regulated growth*, R. Clément, S. Douady* and B. Mauroy*. Phys. Biol. 9, 066006 (9pp), 2012 (* These authors contributed equally to this work). Link to the article

11. *Shape self-regulation in lung morphogenesis*, R. Clément, P. Blanc, B. Mauroy, V. Sapin and S. Douady. PLoS ONE 7(5): e36925, 2012. Link to the article

10. *Don't fall off the adaptation cliff: when do asymmetrical fitness costs select for suboptimal traits?* E. Vercken, M. Wellenreuther, E. I. Svensson and B. Mauroy, PLoS ONE 7(4): e34889, 2012. Link to the article

9. *Towards the modeling of mucus draining from human lung: role of the geometry of the airway tree.* B. Mauroy, C. Fausser, D. Pelca, J. Merckx and P. Flaud, Phys Biol. 8(5):056006, 2011. Link to the article

8. *Electrokinetic Motion of a Deformable Particle: Dielectrophoretic Effect*, Y. Ai, B. Mauroy, A. Sharma and S. Qian, Electrophoresis, 32 (17), pp. 2282-2291, 2011. Link to the article

7. *Shape minimization of the dissipated energy in dyadic trees*, X. Dubois De La Sablonnière*, B. Mauroy* and Y. Privat*, Discrete Contin. Dyn. Syst. (B), 2010. (* authors in alphabetical order) Link to the article

6. *Lumen areas and homothety factor influence airway resistance in COPD*, P. Bokov, B. Mauroy, M.P. Revel, P.A. Brun, C. Peiffer, C. Lebozec-Daniel, M.M. Nay, B. Mahut and C. Delclaux, Respir Physiol Neurobiol. 2010 May 14. Link to the article

5. *Influence of variability on the optimal shape of a dichotomous airway tree branching asymmetrically.* B. Mauroy, P. Bokov, Phys. Biol. 7 (1) 016007, 2010. Link to the article

4. *Optimal Poiseuille flow in a finite elastic dyadic tree*, B. Mauroy*, N. Meunier*, ESAIM: M2AN, 42, 507-534, July-August 2008. (* authors in alphabetical order) Link to the article

3. *Reply to J.P. Butler and A. Tsuda*, B. Mauroy, M. Filoche, J. S. Andrade Jr., and B. Sapoval, Physical Review Letters, 93, 049802 1-1, 22 July 2004. Link to the article

2. *An optimal bronchial tree may be dangerous*, B. Mauroy, M. Filoche, E. R. Weibel, and B. Sapoval. Nature, 427, 633-636, 12 February 2004. Link to the article

1. *Interplay between geometry and flow distribution in an airway tree*, B. Mauroy, M. Filoche, J. S. Andrade Jr., and B. Sapoval, Physical Review Letters, 90, 148101 1-4, 11 April 2003. Link to the article

Reviewed proceedings or reviewed book sections

7. *Influence of lung physical properties on its flow–volume curves using a detailed multi-scale mathematical model of the lung.* R. Di Dio, M. Brunengo, B. Mauroy, CMBE2021, 2022. Link to the proceeding

6. *Modeling and analysis of adipocytes dynamic with a differentiation process.* J. Gilleron*, T. Goudon*, F. Lagoutiére*, H. Martin*, B. Mauroy*, P. Millet*, M. Ribot*, C. Vaghi* (* authors in alphabetical order), ESAIM Proc., ESAIM: ProcS 67, 2020 Link to the proceeding

5. *Modeling shear stress distribution in a deformable airway tree.* J. Stephano and B. Mauroy, proceeding of Canadian Congress of Applied Mechanics, 2019. Link to the proceeding

4. *New analysis of the mechanisms controlling the bronchial mucus balance*, C. Karamaoun, B. Sobac, B. Mauroy, A. Van Muylem, B. Haut, proceeding of Canadian Congress of Applied Mechanics, 2019. Link to the proceeding

3. *Energy dissipation in an asymmetric tracheobronchial tree: a CFD analysis*, A. Buess, B. Sobac, B. Mauroy, B. Haut, proceeding of Canadian Congress of Applied Mechanics, 2019. Link to the proceeding

2. *Following red blood cells in a pulmonary capillary.* B. Mauroy, ESAIM Proc, 23, 48-65, 2008. Link to the article

1. *3D Hydrodynamics in the upper human bronchial tree: interplay between geometry and flow distribution.* B. Mauroy, Fractals in Biology and Medicine, vol IV, Birkhauser, 2005. Link to the book chapter

Reviewed conference abstracts

11. *Pulmonary infection characteristics leading to respiratory failure, a modelling approach.*, B. Mauroy, F. Noël, to appear in European Respiratory Journal, sept. 2022.

10. *Modélisation mathématique de l'écoulement du mucus bronchique : Apports pour la kinésithérapie*, C. Fausser, J.C. Jeulin, B. Mauroy, D. Pelca, JRKR, 2022.

9. *Mathematical modeling of the flow of the bronchial mucus*, B. Mauroy, to appear in Acta Physiologica, 2022.

8. *Modelling surface tension effects on mucus transport*, B. Mauroy and H. Kumar, to appear in European Respiratory Journal, sept. 2019.

7. *Lung volume VS air flow: a match for shear stresses distribution in the bronchial tree*, J. Stéphano and B. Mauroy, to appear in European Respiratory Journal, sept. 2019.

6. *Heat and water transfers in the bronchi: clinical insights from a theoretical modeling study*, C. Karamaoun, B. Sobac, B. Mauroy, A. Van Muylem and B. Haut, to appear in European Respiratory Journal, sept. 2019.

5. *Interplay between thermal transfers and degradation of the bronchial epithelium during exercise*, C. Karamaoun, B. Sobac, B. Haut, A. Bernard, F. Daussin, J. Dekerle, V. Bougault and B. Mauroy, to appear as a proceeding of CompBioMed Conference 2019, Sept. 2019

4. *Numerical model of air-mucus interactions in a bronchus*, B. Mauroy and H. Kumar, European Respiratory Journal, vol. 50, no. suppl 61, p. PA2543, Sept. 2017.
3. *Role of bronchus morphology on mucus mobilization during chest physiotherapy*, B. Mauroy, C. Fausser, D. Pelca, J. Merckx, and P. Flaud, European Respiratory Journal, vol. 46, no. suppl 59, p. PA4204, Sep. 2015.
2. *A biomechanical model of chest physiotherapy*, B. Mauroy, S. Rachidi, B. Mitchell, C. Fausser, D. Pelca, J. Merckx, P. Flaud, European Respiratory Journal, vol. 44, no. Suppl 58, p. 4681, Sep. 2014.
1. *Shape self-regulation during lung development*, R. Clément, B. Mauroy, and S. Douady, European Respiratory Journal, vol. 42, no. Suppl 57, p. 1521, Sep. 2013.

Other reviewed documents

2. *Viscosity: an architect for the respiratory system?* B. Mauroy. Habilitation à Diriger des Recherches, Université de Nice-Sophia Antipolis, 15 Décembre 2014. Link to the manuscript
1. *Hydrodynamique dans le poumon, relations entre flux et géométries*, B. Mauroy, PhD thesis, ENS Cachan, 5 July 2004. Link to the manuscript

OTHERS

Preprints, reports

4. *Allometric scaling of heat and water exchanges in the mammals' lung.* B. Sobac, C. Karamaoun, B. Haut, B. Mauroy, 2021. Link to the preprint (arxiv)
3. *Why the most efficient strategy is not always the most frequent? Understanding the cliff-edge equation with mathematical analysis.* B. Mauroy, 2018. Link to the preprint
2. *Functional optimization of mid-level arterial networks*, B. Moreau and B. Mauroy, arxiv, 2014. Link to the preprint
1. *The camera method, or how to track numerically a deformable particle moving in a fluid network.* B. Moreau, P. Dantan, P. Flaud and B. Mauroy, arxiv, 2012. Link to the preprint

Popularization

1. *Géométrie pulmonaire*, B. Mauroy. La Recherche, 382, 96-97, Janvier 2005/Hors-Série La Recherche, 48-51, Décembre 2007/Chapitre du livre Débusquer le hasard (La Recherche-Dunod, 2011).

CONFERENCES, (I)=INVITED / (R)=REVIEWED

36. (I) GDR MecaBio, Grenoble, France, Novembre 2021, *Allometry of the lung ventilation in mammals.*
35. (I) Congrès de la Société Française de Physiology, Nice, France, Août 2021, *Modélisation de l'écoulement du mucus respiratoire.*
34. (R) European Respiratory Society (ERS) 2019 (poster), Madrid, Spain, September 2019, *Modelling surface tension effects on mucus transport.*
33. (I) Côte d'Azur International Workshop on Cell Mechanics Advanced Tools and Applications to Biomedical Problems, Nice, France, September 2019, *Emergence of the geometry of the bronchial tree: from cell behaviour during development to an optimal organ geometry.*
32. (R) Canadian Congress of Applied Mechanics, Sherbrooke, Canada, May 2019, *Modeling shear stress distribution in a deformable airway tree.*

31. (I) Royal Society and Académie des Sciences bilateral meeting, "Mathematics and Biology", Chichely Hall, England, February 2019, *Understanding lung's evolution through modeling.*

30. (I) Conference "Recent Progresses in Mathematical Theories for Biological Phenomena", South Korea, November 2018, *Cliff-edge theory.*

29. (I) Conference "Systèmes Dynamiques et Systèmes Complexes", Nice, June 2018, *Emergence of lung's geometry, complex or not ?*

28. (R) European Respiratory Society (ERS) 2017 (poster), Milano, Italy, September 2017, *Numerical model of air-mucus interactions in a bronchus.*

27. (I) CIMPA-Mauritius research school "Mathematical modeling in biology and medicine", Mauritius, December 2016, *Modeling of mucus draining from the lungs.*

26. (I) GDRI Readinet (poster), Reaction-Diffusion Systems in Mathematics and Biomedicine, Fréjus, France, September 2016, *Modeling of the cliff-edge effect.*

25. (I) International Congress of Physiotherapy 2016 Biomedical Engineering and Physiotherapy, January 2016, Bruxelles, Belgique, *Towards a mathematical and numerical model of chest physiotherapy.*

24. (R) European Respiratory Society (ERS) 2015 (poster), Amsterdam, Netherlands, September 2015, *Role of bronchus morphology on mucus mobilization during chest physiotherapy.*

23. (I) First symposium: Physics of living matter: experiments and theoretical models, Nice, December 2014, *From guinea pigs to lung : a cliff-edge story.*

22. (R) ERS 2014, München, Germany, September 2014, *A biomechanical model of chest physiotherapy.*

21. (I) SIGNALIFE meeting, Nice, April 2014, *An archetypal mechanism for branching organogenesis, application to the lung.*

20. (R) CMD25/JMC14, Paris, August 2014, *An archetypal mechanism for branching organogenesis, application to the lung.*

19. (I) Zentrum für Interdisziplinäre Forschung (ZIF), Bielefeld, Collaboration group Discrete and Continuous Models in the Theory of Networks, April 2014.

18. (I) Zentrum für Interdisziplinäre Forschung (ZIF), Bielefeld, Collaboration group Discrete and Continuous Models in the Theory of Networks, September 2013.

17. (I) GDR METICE Days, Paris, June 2013, *Lung's morphogenesis.*

16. (I) Bio Phys Math conference, Nice, November 2011, *Globules rouges, capillaire et oxygène : une étude numérique.*

15. (R) Journées de la Matière Condensée, Troyes, August 2010, *Étude numérique 2D d'un modèle de globule rouge dans un canal.*

14. (I) CANUM 2010, Carcans-Maubuisson, June 2010, *Rôle de la variabilité sur la forme optimale d'un arbre asymétrique, application aux poumons.*

13. (R) European Society for Evolutionary Biology, Turin (Italy), August 2009, *Don't fall off the adaptation cliff! When asymmetrical fitness costs select for suboptimal traits.*

12. (I) "US France Young Engineering Scientists symposium 2007", Washington (USA), October 2007, *Modelling of red blood cells in a pulmonary capillary.*

11. (I) SMAI 2007, Praz-sur-Arly, June 2007, *Contribution de la simulation directe l'étude de la suspension sanguine* (with P. Dantan).

10. (I) Workshop Modeling of the Respiratory System, Biomechanical, *Computational and Mathematical Aspects, IHP, Paris, December 2007, Towards a modeling of the red blood cell.*

9. (I) Congress "Challenges actuels en mécanique des fluides : modélisation et analyse", CIRM, Marseilles, France, October 2006, *Study of oxygen pathway in the lung.*

8. (I) Workshop "Fluide et Structure", Mulhouse, France, November 2005, *Lung modelling, theoretical and numerical insights.*

7. (R) SMAI 2005, Evian, France, May 2005, *Sensibility of dichotomical trees, application to the lungs.*

6. (I) Congress CEA-GAMNI on Numerical fluid mechanics, Institut Henri Poincaré, Paris, January 2005, *Hydrodynamics in the lungs, relations between flows and geometries.*

5. (I) Conference "Practical Applications of Fractals", Trieste, Italy, November 2004, *The danger of an optimal bronchial tree as a consequence of fractal modelling of the lung.*

4. (I) Congress "Modélisations physico-numérique pour les fluides, les particules et le rayonnement – Confrontation modèles physiques et modèles numériques", Cargèse, France, October 2004, *Hydrodynamics in the lungs, relations between flows and geometries.*

3. (I) Fourth International Symposium, Fractals in Biology and Medicine, Ascona, Swiss, March 2004, *3D Hydronamics in the upper human bronchial tree: interplay between geometry and flow distribution.*

2. (R) ERS 2003, Vienna, Austria, October 2003, *Asymmetry of inspiratory and expiratory fluid dynamics in a branched model of the lung.*

1. (R) ERS 2002 (poster), Stockholm, September 2002, *Interplay between geometry and flow in an airway tree.*

Others

2. Popularization talk (high school, general public), *Poumon, paratonnerres et mathématiques*, Nice, June 2013.

1. Many seminars, either in France or in other countries.