

Methods

Pulmonary Poromechanical Modeling

- Foundations [Biot, 1972, *Ind. U. Math. J.*] [Coussy, 2004] [Chapelle & Moireau, 2014, *Eur. J. Mech. B/Fluids*]
- Lung-specific aspects [Patte, Genet & Chapelle, 2022, *Biomech. Model. Mechanobiol.*]

- Material laws

- Further decomposition $\bar{\Psi}_s(\bar{\underline{\underline{E}}}, \bar{\Phi}_s) = \bar{W}_{\text{skel}}(\bar{\underline{\underline{E}}}) + \bar{W}_{\text{bulk}}(\bar{\Phi}_s)$
 - Rescaling
 - Constitutive choice
- $$\begin{cases} \bar{\Psi}_s = \bar{\Phi}_{s0} \Psi_s \\ \bar{W}_{\text{skel}} = \bar{\Phi}_{s0} W_{\text{skel}} \\ \bar{W}_{\text{bulk}} = \bar{\Phi}_{s0} W_{\text{bulk}} \end{cases}$$

$$\begin{cases} W_{\text{skel}} = \beta_1 (I_1 - 3 - 2 \ln(\bar{J})) + \beta_2 (I_2 - 3 - 4 \ln(\bar{J})) + \alpha (\delta(\bar{J}^2 - 1 - 2 \ln(\bar{J})) - 1) \\ W_{\text{bulk}} = \kappa \left(\frac{\bar{\Phi}_s}{\bar{\Phi}_{s0}} - 1 - \ln \left(\frac{\bar{\Phi}_s}{\bar{\Phi}_{s0}} \right) \right) \end{cases}$$

