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BREATHING AS A PERIODIC GAS EXCHANGE IN A DEFORMABLE POROUS MEDIUM

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We represent the mammalian lungs as a deformable viscoelatic porous medium surrounded by a deformable viscoelastic tissue.

Following [1], the hysteretic pressure-volume relationship is described by the Preisach operator in the constitutive equation. We consider breathing as an isothermal time-periodic process with gas exchange between the interior and exterior of the body. The evolution of the system is governed by the mass conservation principle and the momentum balance equation. The mathematical problem consists in solving a PDE system with the time derivative of the Preisach hysteresis operator in the mass balance equation, in the spirit of [2]. The main result, in [3], consists in proving the existence of a periodic solution under an arbitrary periodic forcing and suitable hypotheses.

References

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