On Kelvin-Voigt viscoelastic solid model with an implicit constitutive relation for the viscous part

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Kelvin-Voigt viscoelastic solid model

$$\rho_0 \frac{dv}{dt} = \operatorname{div} \mathbf{T}. \tag{1}$$

$$\mathbf{T} = \mathbf{T}_e + \mathbf{S} \tag{2}$$

$$\mathbf{T}_e = \mathbf{A}(x)\mathbf{D}u \tag{3}$$

$$\mathbf{G}(\mathbf{S}, \mathbf{D}v) = 0 \tag{4}$$

Kelvin-Voigt viscoelastic solid model

$$\rho_0(x)\partial_t v(t,x) - \operatorname{div} \mathbf{S}(t,x) - \operatorname{div} \mathbf{A}(x)\mathbf{D}u(t,x) = 0 \qquad (5)$$

$$\partial_t u(t,x) = v(t,x) \qquad (6)$$

$$(\mathbf{D}v(t,x), \mathbf{S}(t,x)) \in \mathcal{A} \text{ for a.a. in } (0,T) \times \Omega \qquad (7)$$

- initial conditions
- periodic boundary conditions

Results

- Existence of the weak solution globally in time
- Regularity in the case of "appropriate"data
- Local regularity by time in the sense of Nikolskii spaces

Thank you!