A Variational View on Constitutive Laws in Parabolic Problems

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Abstract

We consider a variational approach to the modelling of viscous fluids. The physical conservation laws of fluid dynamics are posed as side constrains for a functional that measures how much a given flow deviates from the underlying viscous properties of the fluid. Finding minimisers of this constrained functional can be interpreted as a generalised solution concept, even in cases where the constitutive laws are not known analytically.

Based on results on anisotropic quasiconvexity, we discuss parameter regimes where we can prove existence of minimisers, and where we can recover well-known results through our variational methods.

References

[1] Schiffer, Stefan and Xylander, Espen. "A variational view on constitutive laws in parabolic problems" *Advances in Calculus of Variations.* https://doi.org/10.1515/acv-2025-0076