Nečas Center for Mathematical Modeling

MOdelling REvisited + MOdel REduction

ERC-CZ project LL1202 - MORE

MINISTRY OF EDUCATION, YOUTH AND SPORTS

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Block 1

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Block 2

- Balance equations

$$\frac{\partial \varrho}{\partial t} + \operatorname{div}(\varrho \mathbf{v}) = 0$$

$$\frac{\partial (\varrho \mathbf{v})}{\partial t} + \operatorname{div}(\varrho \mathbf{v} \otimes \mathbf{v}) = \operatorname{div} \mathbf{T}$$

$$\frac{\partial \varrho \left(e + |\mathbf{v}|^2/2\right)}{\partial t} + \operatorname{div}\left(\varrho \left(e + |\mathbf{v}|^2/2\right) \mathbf{v}\right) = \operatorname{div}\left(\mathbf{T}\mathbf{v} + \mathbf{q}\right)$$

$$\mathbf{T} = -p\mathbf{I} + 2\mu\mathbf{D}$$

Example block

Just an example block.

Bibliography

Bulíček, M., P. Gwiazda, J. Málek a A. Świerczewska-Gwiazda (2012). On unsteady flows of implicitly constituted incompressible fluids. *SIAM Journal on Mathematical Analysis 44* (4), 2756–2801.

Bulíček, M., P. Gwiazda, J. Málek, K. R. Rajagopal a A. Świerczewska-Gwiazda (2012). On flows of fluids described by an implicit constitutive equation characterized by a maximal monotone graph. In *Mathematical Aspects of Fluid Mechanics*, Volume 402 of *London Mathematical Society Lecture Note Series*. Cambridge University Press.

Conclusions

- Joint formulation of LP and QP relaxation → LPQP.
- LPQP solved by a message-passing algorithm for modified unary potentials.
- Get a smooth objective for free. Key to fast convergence.
- Competitive results in terms of MAP state found.

Fermat's Last Theorem

Fermat's Last Theorem states that

$$x^n + y^n = z^n$$

has no non-zero integer solutions for x, y and z when $n > 2$.

Have serious fun

- Coriolis acceleration
- Transversal acceleration
- Centripetal acceleration

$$\mathbf{a}_p = \mathbf{a}_o + \frac{{}^b d^2}{dt^2}\mathbf{r} + 2\omega_{ib} \times \frac{{}^b d}{dt}\mathbf{r} + \alpha_{ib} \times \mathbf{r} + \omega_{ib} \times (\omega_{ib} \times \mathbf{r}) \quad (1)$$