A generalized approach towards a new log law of the wall in Taylor-Couette flows at intermediate Reynolds numbers.

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The classical, linear, logarithmic law in the homogeneous isotropic turbulence works very well at very high Reynolds number, even in the Taylor-Couette (TC) system [1]. However, at intermediate Reynolds number in the wall regions of the TC system, close to the inner and outer cylinders, the azimuthal velocity profile reveals a significant deviation from this classical logarithmic law [1,2]. Singh *et al.* [3] proposed a new law of the wall based on the turbulent mixing length. It behaves nonlinearly with the radial wall distance. This law is derived from the momentum balance of the Reynolds averaged azimuthal velocity and is validated by comparison to different data. Considering the available data in the literature, a generalized approach is presented to estimate its two constants of integration : the mixing length, C_{lm}, and log law, C_u constant. This approach is presented separately for only inner cylinder rotation and rotation of both cylinders in co- or counter- rotation for multiple geometries of the TC system.

Références

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