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"*Inertial Particles in a viscous fluid: The Maxey-Riley equation*"

The characterisation of the dynamics of a small inertial particle in a viscous fluid is a problem that dates to Stokes[1], back in 1851. Since his first attempt, many have tried and several formulas have been obtained for different types of flows, as well
as more general cases; however, the scientific community did not agree in a general formula until 1983, when M. Maxey and J. Riley[2] obtained a formula from first principles. This formula includes an integro-differential term, called the Basset History term, which
requires information for the whole history of the particle dynamics and creates difficulties in the numerical implementation due to fast increasing storage requeriments.
In the last decade, the Maxey-Riley formula has drawn the interest of many mathematicians and so, local and global existence and uniqueness of mild solutions have been proved ([3] & [4]).
Nevertheless, a method to bypass the history term and obtain the trajectory
of the particle remained unknown until the publication of an accurate solution method by S.Ganga Prasath et al (2019) [5].
In this presentation I will analyse the Maxey Riley equation and will identify the core ideas within S. Ganga Prasath's method to solve the Maxey Riley equation as well as its implementation for certain fluid flows.

[1] Stokes, G. G. (1851). On the effect of the internal friction of fluids on the motion of pendulums.
[2] Maxey, M. R., & Riley, J. J. (1983). Equation of motion for a small rigid sphere in a nonuniform flow. The Physics of Fluids, 26(4), 883-889.
[3] Farazmand, M., & Haller, G. (2015). The Maxey–Riley equation: Existence, uniqueness and regularity of solutions. Nonlinear Analysis: Real World Applications, 22, 98-106.
[4] Langlois, G. P., Farazmand, M., & Haller, G. (2015). Asymptotic dynamics of inertial particles with memory. Journal of nonlinear science, 25(6), 1225-1255.
[5] Prasath, S. G., Vasan, V., & Govindarajan, R. (2019). Accurate solution method for the Maxey–Riley equation, and the effects of Basset history. Journal of Fluid Mechanics, 868, 428-460.