The Fully Mixed Finite Element Method for Contact Problems with Signorini and Tresca-Friction Conditions

Guanyu Zhou

Institute of Fundamental and Frontier Sciences,

University of Electronic Science and Technology of China, P. R. China

Email: zhoug@uestc.edu.cn

In this talk, we focus on studying contact problems with Signorini and Tresca-friction conditions in the fully mixed form, where stress is treated as a new unknown. Our investigation covers the well-posedness of the mixed formulations in both the continuous and discrete sense, along with establishing error estimates for the discrete mixed variational inequality. Additionally, we will be presenting several Active/Inactive set algorithms designed to solve the fully mixed variational inequality. We also delve into the analysis of penalty approaches in the fully mixed form and their convergence. Finally, we will provide numerical experiments to verify the theoretical convergence rates of the finite element discretization and the iteration algorithms.

References:
[1] Q. Wang, J. Hu and G. Zhou, The mixed method with two Lagrange multiplier formulations for the Signorini problem, J. Comput. Appl. Math. 452 116115 (2024).
[2] J. Hu, Q. Wang and G. Zhou, The mixed penalty method for the Signorini problem, ESAIM: M2AN, 58 1823--1851 (2024).