

ANALYSIS SEMINAR

Consensus and control of Hegselmann-Krause models with time delay

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Abstract. We analyze the asymptotic behavior of a Hegselmann-Krause opinion formation model with time delay. Under appropriate assumptions, we prove an exponential consensus estimate when the time delay satisfies a suitable smallness assumption. Our arguments are based on a Lyapunov functional approach and require careful estimates on the trajectories. We then study the mean-field limit from the many-individual equation to the continuity-type partial differential equation as the number of individuals goes to infinity. For the limiting equation, we prove global-in-time existence and uniqueness of measure-valued solutions. Moreover, we extend to the continuum model the exponential consensus result. Finally, we illustrate a controllability result for a Hegselmann-Krause opinion formation model in the presence of a leader.

References

- [1] Y.-P. Choi, A. Paolucci and C. Pignotti, *Consensus of the Hegselmann-Krause opinion formation model with time delay*, Math. Methods Appl. Sci. 44 (2021), no. 6, 4560-4579.
- [2] A. Paolucci and C. Pignotti, *On the control of the Hegselmann-Krause model with leadership and time delay*, ArXiv:2105.14248.