Multiplicative controllability for nonlinear reaction-diffusion equations

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Abstract

In this talk we present some results concerning the global approximate controllability of semilinear reaction-diffusion equations governed via the coefficient of the reaction term (multiplicative or bilinear control). We study both uniformly parabolic and degenerate equations. We start to consider a one-dimensional uniformly parabolic problem and we extend in [1] some nonnegative controllability results by bilinear controls (see, e.g., [2]) assuming that both the initial and target states admit no more than finitely many changes of sign. Our method uses a technique employing the shifting of the points of sign change by making use of a finite sequence of initial-value pure diffusion problems. The results obtained in [1] have allowed us to approach the multidimensional case with radial symmetry. In this way, we obtain an approximate controllability result for data which admit finitely many hyperspheres of sign change. The method, introduced in [1] for uniformly parabolic equations, can be also extended to degenerate reaction-diffusion equations (see [3]) with application to some energy balance models in climatology (see the Budyko-Sellers model).

References

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