Inverse problem for a parabolic system with three components by measurements of one component

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Abstract

We consider a 3×3 system of parabolic equations and establish a Carleman estimate by extra data of only one component without data of initial values. Then we apply the Carleman estimate to inverse problems of determining some or all of the coefficients by observations in an arbitrary subdomain over a time interval of only one component and data of three components at a fixed positive time θ over the whole spatial domain. The main results are Lipschitz stability estimates for the inverse problems. For the Lipschitz stability, we have to assume some non-degeneracy condition at θ for the three components and for it, we can control the three components of the 3×3 system by inputs to only one component. Such controllability is proved also by our new Carleman estimate.