

**STABILITY OF DEGENERATE HEAT EQUATION IN
NON-CYLINDRICAL/CYLINDRICAL DOMAIN**

ABSTRACT. In this paper we investigate the stability of a degenerate heat equation

$$u_t(x, t) = (x^\alpha u_x(x, t))_x, \quad x \in (0, 1), t > 0$$

in a non-cylindrical/cylindrical domain. It is well known that the heat equation without degeneracy is exponentially stable in cylindrical domain. In the case of degeneracy, we first extend the existing result [1] on uniform exponential stability in cylindrical domain from $\alpha \in (0, 1)$ to $\alpha \in (0, 2]$. For a class of non-cylindrical domain (linear moving boundary), we show that the stability depends on the degeneration index α . More precisely, it is not exponentially stable for $\alpha = 0, 1$ but polynomially stable for $\alpha = 1$; is analogously exponentially stable for $1 < \alpha < 2$; and is exponentially stable for $\alpha = 2$. It is interesting to see that there is a positive impact of the degeneracy on stability in non-cylindrical domain.

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References.

- (1) Wang, C.; *Boundary behavior and asymptotic behavior of solutions to a class of parabolic equations with boundary degeneracy*, Discrete Contin. Dyn. Syst. 36, 1041-1060 (2014).