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Existence and exponential stability of a damped wave equation with dynamic boundary conditions and a delay term

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In this paper we consider a multi-dimensional wave equation with dynamic boundary conditions related to the Kelvin-Voigt damping and a delay term acting on the boundary. If the weight of the delay term in the feedback is less than the weight of the term without delay or if it is greater under an assumption between the damping factor, and the difference of the two weights, we prove the global existence of the solutions. Under the same assumptions, the exponential stability of the system is proved using an appropriate Lyapunov functional. More precisely, we show that even when the weight of the delay is greater than the weight of the damping in the boundary conditions, the strong damping term still provides exponential stability for the system.

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