Solutions of the wave equation bounded at the Big Bang

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By solving a singular initial value problem, we prove the existence of solutions of the wave equation $\Box_g \phi = 0$ which are bounded at the Big Bang in the Friedmann-Lemaître-Robertson-Walker cosmological models. More precisely, we show that given any function $A \in H^3(\Sigma)$ (where $\Sigma = \mathbb{R}^n, \mathbb{S}^n$ or $\mathbb{H}^n$ models the spatial hypersurfaces) there exists a unique solution ϕ of the wave equation converging to A in $H^1(\Sigma)$ at the Big Bang, and whose time derivative is suitably controlled in $L^2(\Sigma)$.