On Some $L_r$-Biharmonic Euclidean Hypersurfaces

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Abstract: In decade eighty, Bang-Yen Chen introduced the concept of biharmonic hypersurface in the Euclidean space. An isometrically immersed hypersurface $x: M^n \to \mathbb{E}^{n+1}$ is said to be biharmonic if $\Delta^2 x = 0$, where $\Delta$ is the Laplace operator. We study the $L_r$-biharmonic hypersurfaces as a generalization of biharmonic ones, where $L_r$ is the linearized operator of the $(r+1)$th mean curvature of the hypersurface and in special case we have $L_0 = \Delta$. We prove that $L_r$-biharmonic hypersurface of $L_r$-finite type and also $L_r$-biharmonic hypersurface with at most two distinct principal curvatures in Euclidean spaces are $r$-minimal.