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A Remark on the Structure of the Busemann Representative of a Polyconvex Function

Under mild conditions on a polyconvex function $W : \mathbf{R}^{2\times 2} \to \mathbf{R}$, its largest convex representative, known as the Busemann representative, may be written as the supremum over all affine functions $\phi : \mathbf{R}^5 \to \mathbf{R}$ satisfying $\phi(\xi, \det \xi) \leq W(\xi)$ for all 2×2 matrices ξ. In this paper, we construct an example of a polyconvex $W : \mathbf{R}^{2\times 2} \to \mathbf{R}$ whose Busemann representative is, on an open set, strictly larger than the supremum of all affine functions ϕ as above and which also satisfy $\phi(\xi_0, \det \xi_0) = W(\xi_0)$ for at least one 2×2 matrix ξ_0.

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