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Integral representation of positive multiply superharmonic functions and consequences

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Let V and W be two connected open sets of $\mathbb{R}^n$ with Green function. A function v defined on the product $V \times W$ is called multiply superharmonic if it is not identically minus infinity, lower semi-continuous and is superharmonic in each variable separately. We prove that the elements in the cone of positive multiply superharmonic functions have a unique integral representation by characterizing the extremal rays of this cone. Applications to the case of functions on polydiscs will be indicated.