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Abstracts

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(P,Q)-Quasiregular Mappings and Classification of Riemannian Manifolds

Let M be connected oriented Riemannian manifolds of dimension n. Manifold M is called p-parabolic if one of the equivalent conditions holds:

1) $\operatorname{cap}(e; W_p^1(M)) = 0$ for every compact subset $e \subset\subset M$;

2) there is no nonconstant positive p-superharmonic function on M;

3) there is no positive Green function for the p-laplacian Δ_p on M;

and p-hyperbolic otherwise [1,2].

Continuous mapping $f : M \to M'$ is called (p,q)*-quasiregular*, $1 \leq q \leq p < \infty$, if $f \in W^1_{1,loc}(G)$ and p*-dilation*

$$K_p(x) = \inf\{K(x) : |D\ f|^p(x) \leq K(x)J(x,f)\}$$

belongs to $L_{\frac{r}{p}}(G)$ where $r = pq/(p-q)$.

Theorem 1. *Let $f : M \to M'$ be a non constant proper (p,q)-quasiregular mapping with bounded degree. If M' is p-parabolic then M is q-parabolic.*

We denote $Df^* : \Lambda^* T_y M'^* \to \Lambda^* T_x M^*$ the associated mapping of the exterior algebras generated by formal differential of f at x, and let $\Lambda_k f : \Lambda^k T_y M'^* \to \Lambda^k T_x M^*$ be the restriction of Df^* at the level of k-forms.

Continuous mapping $f : M \to M'$ is called (p,q)*-coquasiregular*, $1 \leq q \leq p < \infty$, if $f \in W^1_{1,loc}(G)$ and p*-codilation*

$$K_p(x) = \inf\{K(x) : |\Lambda_{n-1} f|^p(x) \leq K(x)J(x,f)\}$$

belongs to $L_{\frac{r}{p}}(G)$ where $r = pq/(p-q)$.

Theorem 2. *Let $f : M \to M'$ be a non constant (p,q)-coquasiregular mapping with bounded degree. If M' is p'-hyperbolic, then M is q'-hyperbolic, where $p' = p/(p-1)$, $\quad q' = q/(q-1)$.*

References

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[2] M. Troyanov, S. K. Vodop'yanov. Liouville type Theorems for Mappings with Bounded (co-)Dilatation. *Potential Analysis*, (to appear).