Summary of Research Statement: G.L.Jones, EPSRC grant GR/K/75453

Gavin Jones has worked principally on ideas related to the welding problem is as foil-lows: given a Jordan curve J on the Riemann sphere S^2, then $S^2 \setminus J = \Omega \cup \Omega^*$ where Ω and $\Omega^* aretwosimply-connectedregions.Thereareconformalmapsf,gfromtheinterirandexterioroftheunitdisctotheregions\Omega$, Ω^* which extend as boundary homeomorphisms. Therefore ont the unit circle we define the orientation=preserving hoomeomorphism $h = g^{-1} \circ f$, the welding. The welding problem consists of the collection of questions relating h to J.

With N.G. Makarov, Gavin Jones has developed an operator-based approach, relating properties of the Jordan curve welded by h with properties of the linear map $V_h : f \mapsto f \circ h$, and the associated Grunsky operator Γ. His work has led to the following.

Theorem [To appear in Mich. Math.J.]

Let f be a conformal map from the unit disc to a Jordan curve with welding h. The following are equivalent, where γ_p denotes the p'the Schatten class of operators on the Dirichelt space $p \in [1, \infty)$.

1. $\Gamma \in \gamma_p$.
2. Let H denote the Hilbert transform. Then the commmutator $[V_h, H] \in \gamma_p$.
3. $\log f' \in B_p$, where B_p is the p'th Besov space ($p \in [1, \infty)$).
4. f extends to a quasiconformal map F of the plane $\mu_F \in L^p(d\lambda)$, where $d\lambda$ denotes nonEuclidean area measure on U^*.
5. $S_f \in L^p(dm_p(z))$, where $dm_p(z) = (1 - |z|)^{2p-2}$, and S_f denotes the Schwarzian derivative.

Theorem (submitted to Ann. Acad. Sci. Fenn.)

Let $\mathcal{D}$ denote Dirichlet space and let $\mathcal{D}_{\sqsupseteq}$ denote a weighted Dirichlet space. Then for certain w, if V_h is bounded from $\mathcal{D}_{\sqsupseteq}$ to $\mathcal{D}$, then h welds a Jordan curve unique to Möbius transformation.

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