Y. KUBOTA
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AN EXTREMAL PROBLEM ON THE CLASSICAL CARTAN DOMAINS, II

BY YOSHIHISA KUBOTA

1. Let D be a bounded domain in C^n and denote by $\mathcal{F}(D)$ the family of holomorphic mappings from D into the unit hyperball B_n in C^n. For a mapping f in $\mathcal{F}(D)$ we denote by $(\partial f/\partial z)$ the Jacobian matrix of f:

$$\left(\frac{\partial f}{\partial z}\right)=\begin{pmatrix} \dfrac{\partial f_1}{\partial z_1} \cdots \dfrac{\partial f_1}{\partial z_n} \\ \cdots\cdots\cdots\cdots \\ \dfrac{\partial f_n}{\partial z_1} \cdots \dfrac{\partial f_n}{\partial z_n} \end{pmatrix}, \qquad f=(f_1, \cdots, f_n).$$

In [3] we were concerned with the problem of maximizing $|\det(\partial f/\partial z)_{z=z_0}|$ for $f\in\mathcal{F}(D)$, where z_0 is a fixed point in D, and we found the precise value

$$M(0, D)=\sup_{f\in\mathcal{F}(D)}\left|\det\left(\frac{\partial f}{\partial z}\right)_{z=0}\right|$$

for classical Cartan domains. In this paper we shall find the value $M(0, D)$ for products of classical Cartan domains.

By a classical Cartan domain we understand a domain of one of the following four types:

$$R_{\mathrm{I}}(r, s)=\{Z=(z_{ij}):\ I-Z\bar{Z}'>0\,,\ \text{where } Z \text{ is an } r\times s \text{ matrix}\},\ (r\leqq s)\,,$$

$$R_{\mathrm{II}}(p)=\{Z=(z_{ij}):\ I-Z\bar{Z}'>0\,,\ \text{where } Z \text{ is a symmetric matrix of order } p\},$$

$$R_{\mathrm{III}}(q)=\{Z=(z_{ij}):\ I-Z\bar{Z}'>0\,,\ \text{where } Z \text{ is a skew-symmetric matrix of order } q\},$$

$$R_{\mathrm{IV}}(m)=\{z=(z_{11}, \cdots, z_{1m}):\ 1+|zz'|^2-2z\bar{z}'>0\,,\ 1-|zz'|>0\}.$$

Instead of $R_{\mathrm{II}}(p)$ we consider the following modified domain:

$$\hat{R}_{\mathrm{II}}(p)=\{Z=(z_{ij}):\ z_{ij}=\sqrt{2}\,x_{ij}\ (i\neq j),\ z_{ii}=x_{ii}\,,\ \text{where } X=(x_{ij})\in R_{\mathrm{II}}(p)\}.$$

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