1067-28-1291 **David P. Kimsey*** (kimsey@drexel.edu), Department of Mathematics, 3141 Chestnut Street, Philadelphia, PA 19104, and **Hugo J. Woerdeman** (hugo@math.drexel.edu), Department of Mathematics, 3141 Chesnut Street, Philadelphia, PA 19104. *The truncated matrix-valued K-moment problem on $\mathbb{R}^d$, $\mathbb{C}^d$, and $\mathbb{T}^d$.* Preliminary report.

The truncated matrix-valued K-moment problem on $\mathbb{R}^d$, $\mathbb{C}^d$, and $\mathbb{T}^d$ will be considered. The matrix-valued truncated K-moment problem on $\mathbb{R}^d$ requires necessary and sufficient conditions for a sequence of Hermitian matrices $\{S_\gamma\}_{\gamma\in\Gamma}$, where Γ is a finite subset of $\mathbb{N}_0^d$, to be the corresponding moments of a positive matrix-valued Borel measure σ and also the support of σ must lie in some given non-empty set $K \subseteq \mathbb{R}^d$, i.e.

$$S_\gamma = \int_{\mathbb{R}^d} \xi^\gamma d\sigma(\xi), \quad \gamma \in \Gamma, \tag{1}$$

and

$$\text{supp } \sigma \subseteq K. \tag{2}$$

Given a set $K \subseteq \mathbb{R}^d$ and a finite sequence, indexed by a certain family of finite subsets of $\mathbb{N}_0^d$, of Hermitian matrices we obtain necessary and sufficient conditions for the existence of a finitely atomic measure which satisfies (1) and (2). In particular, our result can handle the case when the indexing set that corresponds to the powers of total degree at most $2n+1$. We will also discuss a similar result in the complex and polytorus setting. (Received September 20, 2010)