Yakymiv A. L. (Moscow, Russia) — **Multivariate regular variation and multiple power series distributions.**

Let $(a(i) \geq 0,\ i \in Z_+^n)$ be any sequence such that the power series

$$B(x) = \sum_{i \in Z_+^n} a(i) x^i \equiv \sum_{i_1,\ldots,i_n \in Z_+} a(i_1,\ldots,i_n) x_1^{i_1} \ldots x_n^{i_n} \in (0,\infty)$$

for $x = (x_1,\ldots,x_n) \in [0,1)^n$. Assume that, for $x \in (0,1)^n$, the random vector ξ_x has the power series distribution $B(x)$, i.e. $\mathsf{P}\{\xi_x = i\} = a(i)x^i/B(x),\ \forall i \in Z_+^n$. Let the sequence $b = b(k) = (b_1(k),\ldots,b_n(k)) \in (0,\infty)^n,\ k \in N$ be given with $b_j = b_j(k) \to \infty,\ \forall j = 1,\ldots,n$ as $k \to \infty$. Also suppose that $B(x)$ is regularly varying as $x \uparrow \mathbf{1}$ along $b = b(k)$ i.e.

$$\frac{B(\exp(-\lambda/b))}{B(\exp(-\mathbf{1}/b))} \equiv \frac{B(\exp(-\lambda_1/b_1),\ldots,\exp(-\lambda_n/b_n))}{B(\exp(-1/b_1),\ldots,\exp(-1/b_n))} \to \Psi(\lambda) \in (0,\infty) \qquad (1)$$

for any fixed $\lambda = (\lambda_1,\ldots,\lambda_n) \in (0,\infty)^n$ as $k \to \infty$. Furher, assume that, for any sequence $z_j = z_j(k) > 1, z_j = 1 + o(1)$ and for every $j = 1,\ldots,n$ either lim inf of the fraction $a(b_1,\ldots,b_{j-1},z_j b_j,b_{j+1},\ldots,b_n)/a(b)$ is ≥ 1 or lim sup of this fraction is ≤ 1 as $k \to \infty$. Fix any $u \in (0,\infty)^n$ and put $x = \exp(-u/b)$. It follows from (1) that the function $\Psi(\lambda)$ is the Laplace transform of some σ-finite measure ν on R_+^n. Let this measure ν be absolutely continuous in $(0,\infty)^n$ with continuous density $\varphi(\cdot)$. Then, for any compact $K \subset (0,\infty)^n$

$$\frac{\mathsf{P}\{\xi_x = [y/(\mathbf{1}-x)]\}}{\prod_{j=1}^n (1-x_j)} \overset{y \in K}{\rightrightarrows} \frac{\varphi(y/u)\exp(-(y,\mathbf{1}))}{\prod_{j=1}^n u_j \Psi(u)}.$$

The proof of this result essentially uses the theorem 3 from [1]. A short review on different definitions of multivariate regular variation will followed in the talk.

REFERENCES

1. *Yakymiv A.L.* A Tauberian theorem for multiple power series, Sb. Math., 2016, vol. 207, № 1, pp. 287–313.

This work is fulfilled in the framework of the MIAN state assignment.