Yakymiv A. L. (Moscow, Russia). **Moment asymptotics of a number of cycles in a random A-permutation.**

Fix an arbitrary set A of natural numbers. Let $T_n(A)$ be the set of all permutations of n elements with cycle lengths belonging to the set A (so-called A-permutations). A random permutation τ_n uniformly distributed at the set $T_n(A)$ is considered. After ζ_n we denote the number of its cycles. Put $A(n) = A \cap [1, n]$, $l(n) = \sum_{i \in A(n)} 1/i$. Let for some $C > 0$, $\lambda \geq 0$, $\varrho \in (0, 1]$ and slowly varying at infinity function $L(n)$

$$\frac{|T_n(A)|}{n!} = Cn^{\varrho-1}(1 + O(n^{-\lambda}L(n)) \quad (n \to \infty).$$

Then

$$\mathsf{E}\zeta_n = l(n) - \frac{1}{n}\chi\{n \in N \setminus A\} + \sigma(n) + O(r(n)),$$

as $n \to \infty$ where

$$\sigma(n) = \sum_{m \in A(n-1)} \frac{1}{m}\left(\left(1 - \frac{m}{n}\right)^{\varrho-1} - 1\right) \to \varrho \int_0^1 \frac{1}{x}\left((1-x)^{\varrho-1} - 1\right) dx,$$

$$r(n) = \begin{cases} n^{-\lambda}L(n)\ln n, & \text{если } \varrho > \lambda, \\ n^{-\varrho}, & \text{если } \varrho < \lambda, \\ n^{-\lambda}\int_1^n L(x)/x\, dx, & \text{если } \varrho = \lambda. \end{cases}$$

Also, we obtain asymptotic formulas for kth moments of ζ_n, for fixed $k > 1$. The corresponding examples of sets A are given. Note that the asymptotic properties of $\mathsf{E}\zeta_n$, $\mathsf{D}\zeta_n$, as well as limit theorems for ζ_n, and for other characteristics of the random permutation τ_n, were studied at $A = N$ in the fundamental work of V. L. Goncharov [1].

REFERENCES

1. *Goncharov V.L.* On the field of combinatory analysis, Amer. Math. Soc. Transl., Ser. 2, 1962, vol. 19, pp. 1–46.

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