András Rapcsák
(1914 – 1993)

On October 16, 1993 died András Rapcsák emeritus professor of the Lajos Kossuth University, Debrecen, member for 33 years of the Editorial Board of our journal Publicationes Mathematicae Debrecen.

He was born at Hódmezővásárhely in 1914. After graduating from secondary school at his native town he entered Szeged University. He had there as excellent teachers as professors F. Riesz, A. Haar, B. Kerékjártó, L. Kalmár. A disease which started at this time in his leg and for the rest of his life accompanied him, caused that he could finish his university studies only in 1942. After teaching at several schools he was appointed professor at the Institute of Mathematics of Debrecen University in 1952 and he worked there during all his life.

In Debrecen he joined Prof. Ottó Varga and started studies in Finsler geometry, the main field of his scientific activity. Among his achievments let us mention here three results only (a list of his papers can be found at the end of this obituary). — He constructed a complete system of

invariants of a Cartan space (which is built upon the hyperplane elements, and thus can be considered as the dual of the Finsler space, with line-elements as support). This gives basically a characterization of a Cartan space in the sense of F. Klein's Erlanger program.

Mathematicians have long time ago revealed the importance of the existence of planes in a Riemannian geometry. It is well known that the unrestricted existence of totalgeodesic planes (i.e. through each point and each plane position) characterizes the Riemannian spaces of constant curvature. A. Rapcsák cleared up the similar, but more complicated situation in a Finsler space. In a Finsler space F_n there exist more types of hyperplanes: a hypersurface $\phi \subset F_n$ is called a hyperplane of the I) kind if goedesics of ϕ are geodesics of F_n too (i.e. if ϕ is totalgeodesic); of the II) kind if each quasigeodesic in ϕ is quasigeodesic in F_n; of the III) kind if the parallel translated along any curve of ϕ of a normal to ϕ remain normal to ϕ. He showed that the unrestricted existence of hyperplanes is equivalent in the three cases with the following conditions: in case I) F_n is projectively flat; in case II) F_n is projectively flat and $A_{\alpha\beta\gamma|0} = 0$; in case III) F_n is a Riemannian space of constant curvature.

His last result we want to mention here relates to geodesic mapping. Let F_n and $\bar{F}_n$ be two Finsler spaces with fundamental functions $\mathcal{L}(x,y)$ resp. $\bar{\mathcal{L}}(x,y)$. He proved, that they admit a geodesic mapping, iff (*) $\bar{\mathcal{L}}_{|i} = \dfrac{\partial \bar{\mathcal{L}}_{|v}}{\partial y^i} y^v$, where $|$ means Berwald covariant derivative according to the F_n. If F_n is an euclidean or a Minkowskian space, then (*) gives a condition for $\bar{F}_n$ to be projectively flat. In this case the geodesics of $\bar{F}_n$ are straight lines. Thus he obtained an answer to D. Hilbert's famous fourth problem (restricting his investigations to the rather general case of a Finsler space) inquiring for the geometries (variational problems) where all geodesics are straight lines. His answer is different from that of J. Douglas, N. S. Knebelman and L. Berwald because his condition is expressed directly by the metric functions. He considered this result and his other investigations on this field as his most important achievments in Finsler geometry.

Professor Rapcsák was an excellent and very popular university teacher. His lectures and seminars were famous among his students. Finally I would like to mention his charming personality, his impressive command not only of mathematics and physics, but of other fields such as literature, history and culture. His friends can tell many stories about his humor, warmth and his never ending helpfulness.

His passing away is a sensitive loss to the Hungarian geometers and to Debrecen University whose Rector he was for a long period.

L. Tamássy

List of papers of András Rapcsák

[1] Theory of surfaces in Minkowski spaces (Ph.D. Thesis), *Debrecen*, 1947, (in Hungarian).

[2] Kurven auf Hyperflächen im Finslerschen Raume, *Hungarica Acta Math.* **1** (1949), 21–27.

[3] A new definition of normal coordinates in a Finsler space, *Acta Univ. Debrecen* **1** (1954), 109–116, (in Hungarian).

[4] Invariante Taylorsche Reihe in einem Finslerschen Raum, *Publ. Math. Debrecen* **4** (1955–1956), 49–60.

[5] Über das vollständige System von Differentialinvarianten im regulären Cartanschen Raum, *Publ. Math. Debrecen* **4** (1955–1956), 276–293.

[6] Theorie der Bahnen in Linienelementmannigfaltigkeiten und eine Verallgemeinerung ihrer affinen Theorie, *Acta Sci. Math. (Szeged)* **16** (1955), 251–265.

[7] Eine neue Charakterisierung Finslersche Räume skalarer und konstanter Krümmung und projektiv-ebene Räume, *Acta Math. Acad. Sci. Hungar.* **8** (1957), 1–18.

[8] Metrische Charakterisierung der Finslerschen Räume mit verschwindender projektiver Krümmung, *Acta Sci. Math. (Szeged)* **18** (1957), 192–204.

[9] Hyperplanes in a Finsler space, *Acta Univ. Debrecen* **4** (1959), 85–87, (in Hungarian).

[10] Über die Begründung der lokalen metrischen Differentialgeometrie, *Publ. Math. Debrecen* **7** (1960), 382–393.

[11] Path preserving mappings of metrical and of affinaly connected spaces, *Magyar Tud. Ak. Mat. Fiz. Oszt. Közl. (Reports of the Math. Phys. Class of the Hungarian Academy of Sciences)* **11** (1961), 339–369, (in Hungarian).

[12] Über die bahntreuen Abbildungen affinzusammenhängender Räume, *Publ. Math. Debrecen* **8** (1961), 225–230.

[13] Über die bahntreuen Abbildungen metrischer Räume, *Publ. Math. Debrecen* **8** (1961), 285–290.

[14] Über die Metrisierbarkeit affinzusammenhängender Bahnräume, *Ann. Mat. Pura Appl.* (4) **57** (1962), 233–238.

[15] Die Bestimmung der Grundfunktionen projectiv-ebener metrischer Räume, *Publ. Math. Debrecen* **9** (1962), 164–167.