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A 会場 ：9/26　AM2 （10:45-12:30）
11:15〜11:30

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Development of Affine connections to describe 3D evolving magnetic vector fields and its application to space physics

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We have developed a new connection form to describe the magnetic vector field as a set of different magnetic field lines (vector bundles) and their interrelationships.

In this methodology, the geometry of magnetic field lines as spatial vector curves is grasped by employing magnetic field lines as the principal curves of the Frenet dynamic coordinate system, and by connecting the principal and secondary normals of neighboring magnetic field lines, vector curves are formed.

By adopting this connection form, the magnetic field vector space is filled by the connected local orthonormal coordinate system.

Conventional vector analysis applied to vector bundles of various physical quantities that emerge there can be uniquely described by the torsion and curvature of the principal, normal, and subnormal vector curves of the magnetic field that form the 3D network, as well as their spatial gradient distributions of vector amplitude.

In this talk, I will reconstruct the spatial geometry of the current distribution associated with the spatio-temporal evolution of the magnetic field using this framework, and discuss the importance of linking the development of physical and geometric quantities through specific examples for various types of Ohm's law for magnetic fields induction.