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topics in manifold theory

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A *manifold* is a space that is locally like $\mathbb{R}^n$, however lacking a preferred system of coordinates. Furthermore, a manifold can have global topological properties, such as non-contractible `http://planetmath.org/Curve`loops, that distinguish it from the topologically trivial $\mathbb{R}^n$.

By imposing different restrictions on the transition functions of a manifold, one obtain different types of manifolds:

- topological manifolds

- C^k manifolds, smooth manifolds

- real analytic manifold

- complex analytic manifold

- symplectic manifolds, where transition functions are symplectomorphisms. On such manifolds, one can formulate the Hamilton equations.

Special types of manifolds

- orientable manifolds

- manifolds with boundary

- compact manifolds

On manifolds, one can introduce more . Some examples are:

- Riemannian manifolds

- contact manifolds

- CR manifolds

- fiber bundles and sheaves

Examples

- space-time manifold in general relativity

- phase space in mechanics

- de Rham cohomology in algebraic topology

See also

For the formal definition click http://planetmath.org/Manifoldhere
http://en.wikipedia.org/wiki/ManifoldManifold entry at Wikipedia