Construction of differentiable structures: a tool in continuum mechanics

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Abstract

Let $\overline{\Gamma}$ be a general (Lie or not) subgrupoid of Lie groupoid $\Gamma \rightrightarrows M$. For any element $g \in \Gamma$, we may define a vector space. So, the resulting structure is a *smooth distribution* on Γ, called the *characteristic distribution* of $\overline{\Gamma}$. This distribution permits us to prove, among others results, that there exists a foliation of Γ defining a maximal differentiable structure on $\overline{\Gamma}$ in such a way that $\overline{\Gamma}$ is a Lie subgroupoids of Γ if, and only if, the connected components of the $\beta-$fibres of $\overline{\Gamma}$ are the leaves of the foliation. This results may be applied to construct different differentiable structures generalizing the structure of smooth manifold. This development may be used to study non-uniform material bodies, by dividing the body into maximal uniform parts.

Keywords— Characteristic distribution; groupoid; distribution; vector space; manifold; continuum mechanics

References

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