On Poincaré's and Lions' lemmas and on De Rham's theorem

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SUMMARY

We prove here the equivalence between many important properties concerning: the divergence operator, the Lions lemma, the Necas inequality, the Korn inequality and the weak lemma of Poincaré. Using then the Bogovskii operator and the Calderon-Zygmund theory, we give some isomorphism concerning the divergence operator. We give also a complete proof of the original De Rham theorem and we obtain some extension to the irrotational fields (see [1], [2]).

Keywords: Lions lemma, Necas inequality, Korn inequality, the weak lemma of Poincaré, Calderon-Zygmund theory

AMS Classification: -

References

[1] Amrouche Chérif, Ciarlet Philippe G., Mardare Cristinel. Remarks on a lemma by Jacques-Louis Lions, *C. R. Math. Acad. Sci. Paris*, 352–9, (2014), 691–695.

[2] Amrouche Chérif, Ciarlet Philippe G., Mardare Cristinel. On a lemma of Jacques-Louis Lions and its relation to other fundamental results, *J. Math. Pures Appl.* (9), 104, (2015), no. 2, 207–226.

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