

SURJECTIVITY OF TENSORIZED MAPS AND DIFFERENTIAL EQUATIONS

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Let $T : E \rightarrow F$ and $S : X \rightarrow Y$ be two surjective maps between complete locally convex spaces. It is interesting to know when the tensorized map $T \otimes S : E \hat{\otimes}_\varepsilon X \rightarrow F \hat{\otimes}_\varepsilon Y$ is surjective as a map between completed injective tensor products. This problem has numerous applications to the problem of parameter dependence of solutions of various equations. We consider this problem in the framework of the so-called PLS-spaces which covers all Fréchet Schwartz spaces and their duals as well as most of the classical non-Banach spaces of analysis (for instance, spaces of smooth or holomorphic functions, spaces of distributions or spaces of real analytic functions).

We give criteria of surjectivity in terms of the kernels of T and S — the obtained conditions are interpolation type inequalities between norms. We give applications to the problem of analytic dependence of solutions u of linear partial differential equations $Lu = f$ on the space of distributions where f depends analytically on a parameter. In particular, we show that for elliptic linear partial differential operator $L = P(D)$ with constant coefficients the problem has always a negative solution. On the other hand, for many types of operators $P(D)$ we are able to characterize those P where the answer is in affirmative.

REFERENCES

- [1] P. Domański, *Real analytic parameter dependence of solutions of differential equations*, Rev. Mat. Iberoamericana, 69 pp. to appear
- [2] J. Bonet, P. Domański, *The splitting of exact sequences of PLS-spaces and smooth dependence of solutions of linear partial differential equations*, Advances Math. **217** (2008), 561–585
- [3] J. Bonet, P. Domański, *Parameter dependence of solutions of differential equations on spaces of distributions and the splitting of short exact sequences*, J. Funct. Anal. **239** (2006), 329–381

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