

About some operators over a unit disc related to the Laplace equation.

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We introduce four integral operators closely related to the Laplace equation in three-dimensions on the circular unit disc. Two of them are closed to the simple layer on the disc and the other two are related to the hyper singular operator. Contrary to the case of a closed domain, these operators no longer map fractional Sobolev spaces in a dual fashion but degenerate into different subspaces depending on their extensibility by zero. We establish their variational formulations and the coercivity properties in some Sobolev spaces. They are also linked to the Laplace operator on the disc.

These results are a tentative extension to \mathbb{R}^3 of previous results in \mathbb{R}^2 , contains in a common work with Carlos Jerez-Hanckes that we present in the beginning of the talk. We have introduced explicit and exact variational formulations for some weakly and hyper-singular operators associated to the Log operator over an open flat slit as well as for their corresponding inverses.

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