# Cauchy non-integral formulas

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**Abstract**

This talk concerns generalizations of the Cauchy integral formula which appear in recent joint work with Pascal Auscher. We study solutions to second order divergence form elliptic systems by representing the gradient vector, and conjugate systems, of the solution as a Cauchy type "integral" of the boundary trace. Besides being bounded and accretive, the coefficients of the equation are only assumed to be close to coefficients that are independent of the variable transversal to the boundary in a Carleson sense defined by Dahlberg. We shall use recent Carleson duality results from joint work with Tuomas Hytönen, to give a simplified presentation of the theory as compared to that in the two papers "Weighted maximal regularity estimates and solvability of non-smooth elliptic systems".

For general coefficients as above, the Cauchy formulas appearing are not integral operators. However, for real scalar equations with coefficients independent of the variable transversal to the boundary, the Cauchy formula is at least partly integral, as it contains the classical double layer potential operator. This gives new boundedness results for this operator, for general coefficients, answering a question posed by Steve Hofmann in El Escorial 2008.