

A numerical method for Cauchy problem using singular value decomposition*

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We consider the Cauchy problem for Laplacian. Using the single layer representation, we obtain an equivalent system of boundary integral equations. We show the singular values of the ill-posed Cauchy operator decay exponentially, which means that a small error is exponentially amplified in the solution of the Cauchy problem. We show the decaying rate is dependent on the geometry of the domain, which provides the information on the choice of numerically meaningful modes. We suggest a pseudo-inverse regularization method based on singular value decomposition and present various numerical simulations.

*The full paper posted on Comm. KMS 16(3) pp487-508 can be downloaded from <http://w3.kms.or.kr/ckms/index.htm>