On an inverse crack problem in a linearized elasticity by the enclosure method

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In this talk, we discuss a reconstruction problem for several linear cracks located on a line between two linearized elastic plates from measured data which are a loading surface traction and the resulted displacement field on the boundary of the joined plates. This is a typical problem from the nondestructive testing of materials. For this problem, we introduce an extraction formula of the cracks from a single set of the data by means of the enclosure method. In the case of a *single* linear crack, the extraction formula of the location and shape of an unknown crack is established by using the enclosure method [2]. However, this result cannot be extended to *several* cracks case directly because the original enclosure method can give an extraction formula of the convex hull of cracks. As one of ways to overcome the difficulty, we apply the Kelvin transform to the indicator function of the classical enclosure method. In [1, 3], by virtue of this transform we derived extraction procedure of information about the location of tips of several cracks located on a line between two electric conductive plates from a single set of an electric current density and the corresponding voltage potential on the boundary of the material formed by the plates. In the present talk, I will consider further extension of the result [1] to the linearized elastic case.

References

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