

## SYSTEM FOR RECONSTING IMAGES OF INTERNAL DEFECTS BY INVERSE PROBLEM SOLVING

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Ceramic materials are unreliable for manufacturing large structural components because they are likely to have fatal defects inside and their fracture responses are much faster and more drastic than those of metal materials. Ultrasonic Inspection is effective for inspecting ceramic materials because ultrasonic waves are easily propagated in general ceramic materials[1].

3D scanning system was developed and a UT probe array was operating at 5 MHz[2],[3]. Two kinds of image reconstruction program, aperture synthesis and Truncated Singular Value Decomposition (TSVD), were developed and the results by them were compared (Figure 1).

We calculated images of defect from time series of wave data measured by a UT probe array with 32 elements. Figure 2 presents an image of numerical model of SN sample with two slit defects 100 mm deep, the UT probe array and the dependence of deep defect images reconstructed by TSVD on truncation index  $k$  (128, 256, 512, 1024). Two slit defects in image reconstructed using TSVD on large  $k$  can be identified but those on small  $k$  cannot. TSVD on large  $k$  was proved to be able to solve inverse problem and to produce better image of internal defect 100 mm deep than those on small  $k$ .

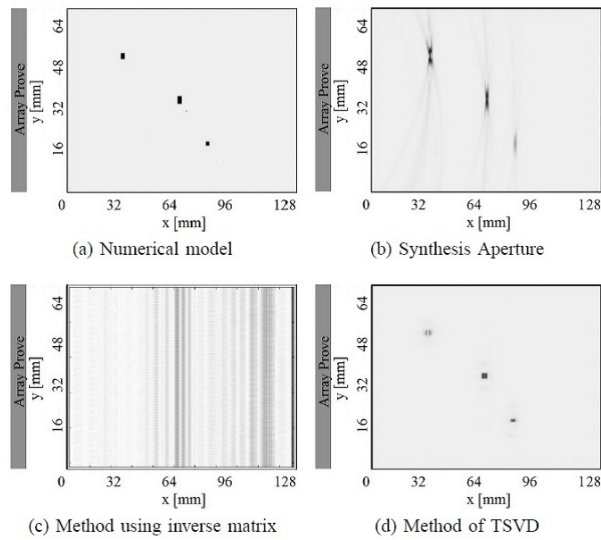


Figure 1: Defect Image reconstructed

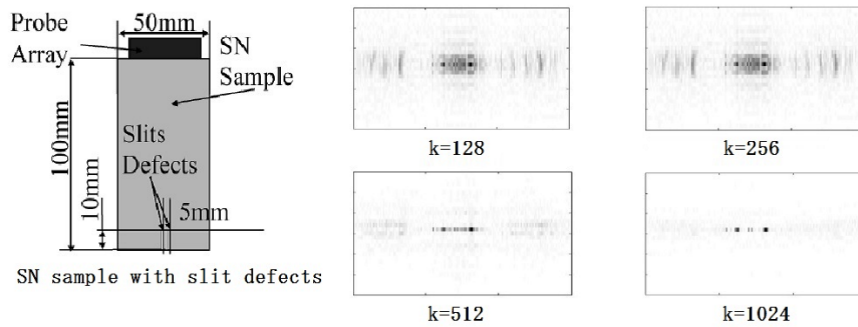


Figure 2: Images of deep defects in SN sample reconstructed using TSVD

## REFERENCES

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