

Structure of the least square solutions and its application to non-destructive inspections

Takashi TAKIGUCHI

Department of Mathematics, National Defense Academy of Japan

email: *takashi@nda.ac.jp*

In this talk, we study the structure of the least square solutions to the following over determined system

$$\begin{cases} F_1(x_1, x_2, \dots, x_n) = 0 \\ \dots \\ F_m(x_1, x_2, \dots, x_n) = 0 \end{cases} \quad (1)$$

where F_j 's are polynomials and $m \gg n$.

We apply its structure and study how to solve the following overdetermined system

$$\begin{cases} (x - x_1)^2 + (y - y_1)^2 + (z - z_1)^2 = r_1^2 \\ \dots \\ (x - x_n)^2 + (y - y_n)^2 + (z - z_n)^2 = r_n^2 \end{cases} \quad (2)$$

for $n \gg 3$, which plays an important role for a non-destructive inspection to probe the precise position of the reinforcing steel in the reinforced concrete structures.

We also mention other applications of the structure of the least square solutions to the system (1), to some non-destructive inspections.

Keywords: Least square solution; non-destructive inspection

Reference

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