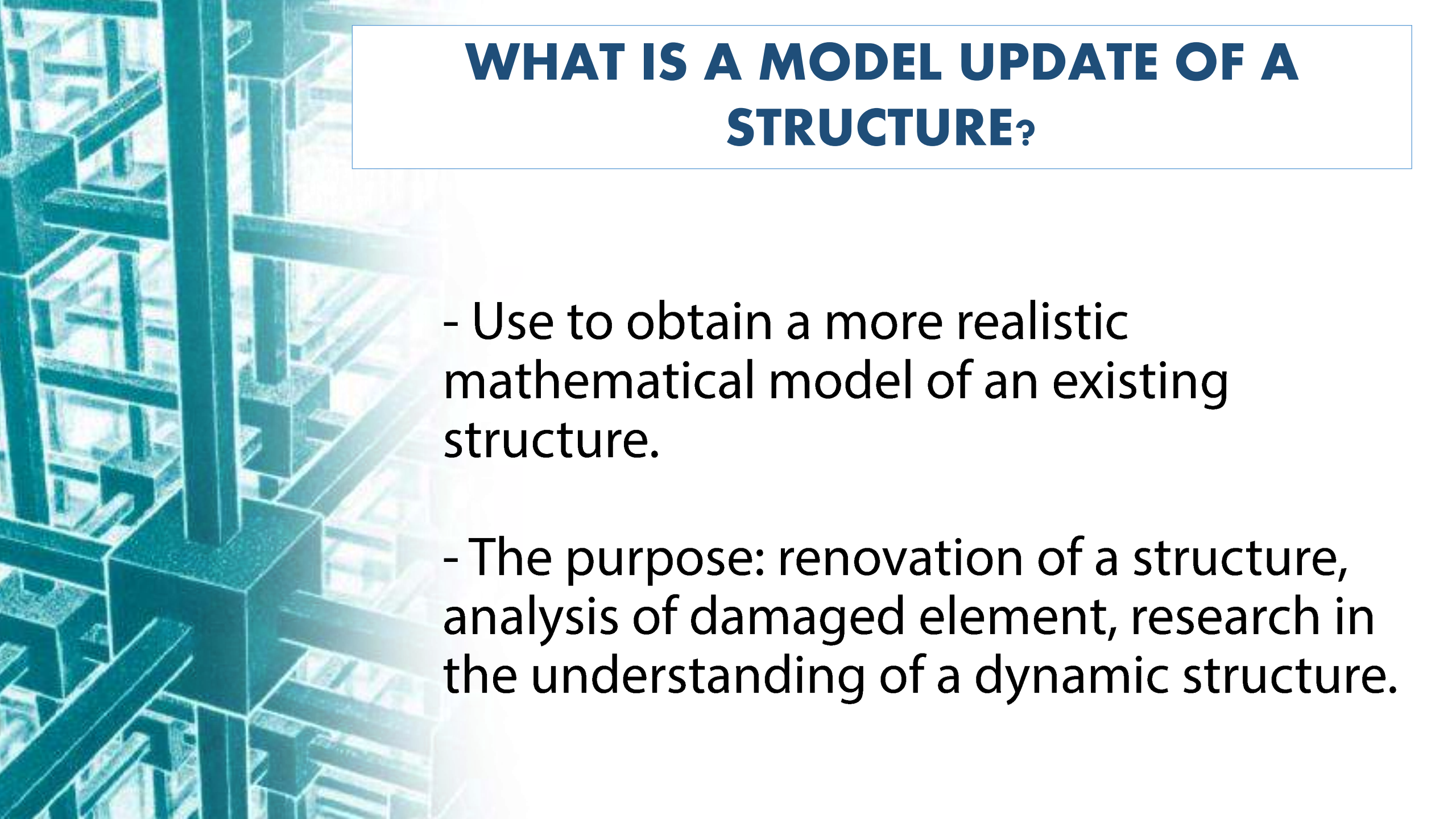


Dynamique des structures

**INVERSE SUBSTRUCTURE METHOD FOR
MODEL UPDATING OF STRUCTURES**

- PRESENTATION BY JEAN LE LUYER -





WHAT IS A MODEL UPDATE OF A STRUCTURE?

- Use to obtain a more realistic mathematical model of an existing structure.
- The purpose: renovation of a structure, analysis of damaged element, research in the understanding of a dynamic structure.



WHY THIS NEW METHOD?

- Traditional method requires a lot of computer calculation time (critical on large-scale structure)
- By studying substructure reduce computational load + have to make less measures.



HOW DOES IT WORK?

- Difficulty is to model the defined border of the substructure (orthogonal projector method)
- Model of the structure compared to measures taken on existing structure.
- Flexibility matrix modify, and so on with each iteration until error with measure is minimal
- Iteration only on the substructure -> faster

PROOF BY EXAMPLE: FIRST STRUCTURE

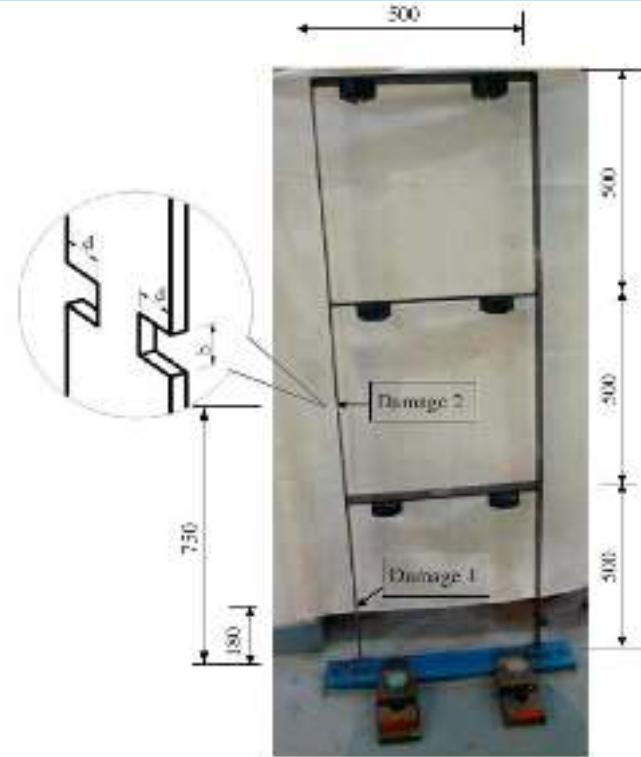
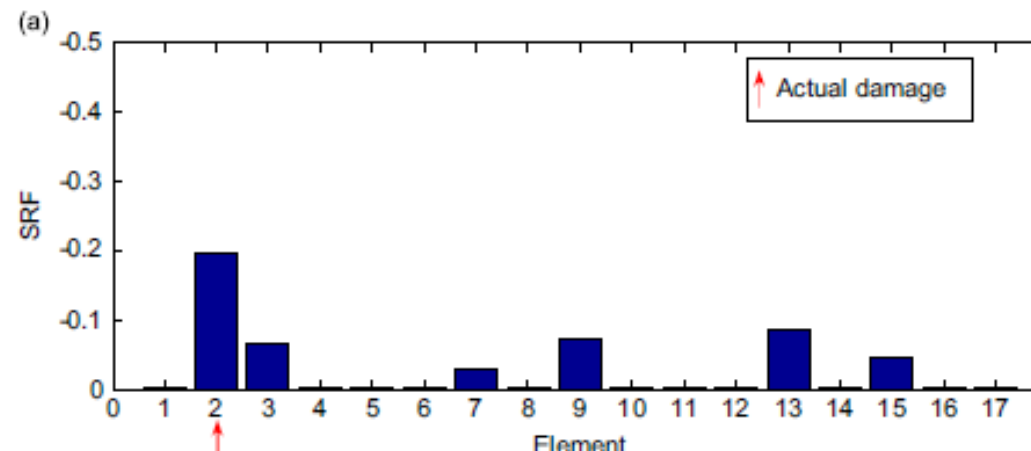


Fig. 2. Overview of the frame structure and the experimental damage configuration (unit: mm).



- Simple laboratory structure
- Both methods tested
- Able to find damage element

PROOF BY EXAMPLE: SECOND STRUCTURE

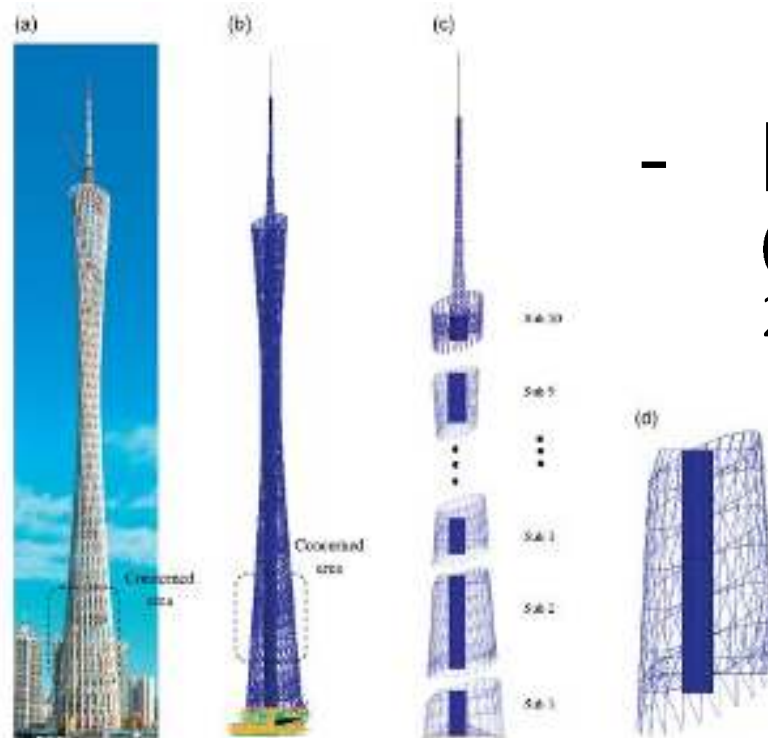


Fig. 13. Guangzhou New Television Tower and the FE model. (a) Landscape view, (b) global model, (c) divided substructures and (d) concerned substructure.

- large-scale structure
(8738 elements, 3671 nodes and
21690 degree of freedom)

- Both method
used

Global structure method

1 iteration: 1.27h
Total process: 17.88h

Substructure method (divided in 10 substructures)

1 iteration: 0.11h
Total process: 1.69h



CONCLUSION OF THE SUBSTRUCTURE METHOD FOR MODEL UPDATING

- New method as efficient as the global method.
- Great future for large-scale structure
- Promising prospect for releasing computational load