

Geometric Medical Data

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Introduction

- **Traditional Medical Data**
 - **CT, MRI**
 - **A Sliced Image**
 - **A Set of Sliced Images**
 - **DICOM**

DICOM(1/2)

- **DICOM**

- Digital Imaging and Communications in Medicine (DICOM) is a standard for handling, storing, printing, and transmitting information in medical imaging
- DICOM includes a file format definition and a network communications protocol.

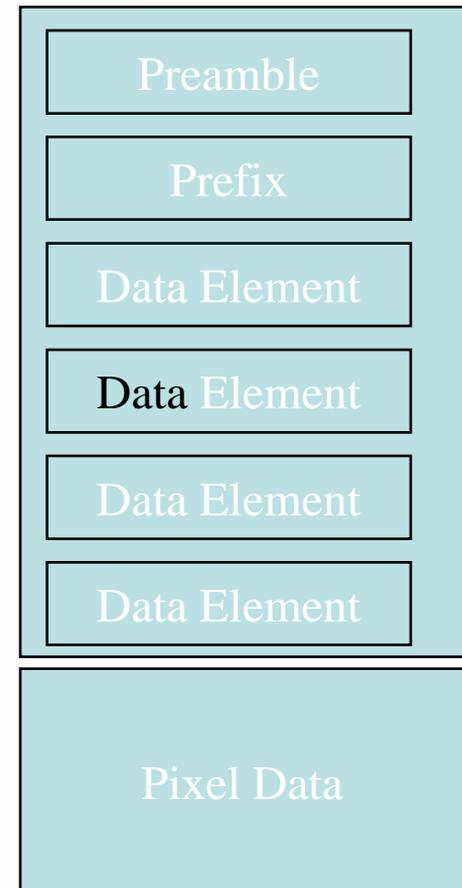
DICOM(2/2)

- **DICOM Data**



Header

Image



X3D nodes for DICOM files

- **X3D Volume Rendering Nodes**

Geometric Medical Data (1/5)

- **Medical Data Type**
 - **Various Medical Devices (not CT, MRI)**
 - **Not Images, But Geometric Data Obtained by Microwave tomogram application devices**
 - **Current, DICOM does not support geometric data**

Geometric Medical Data (2/5)

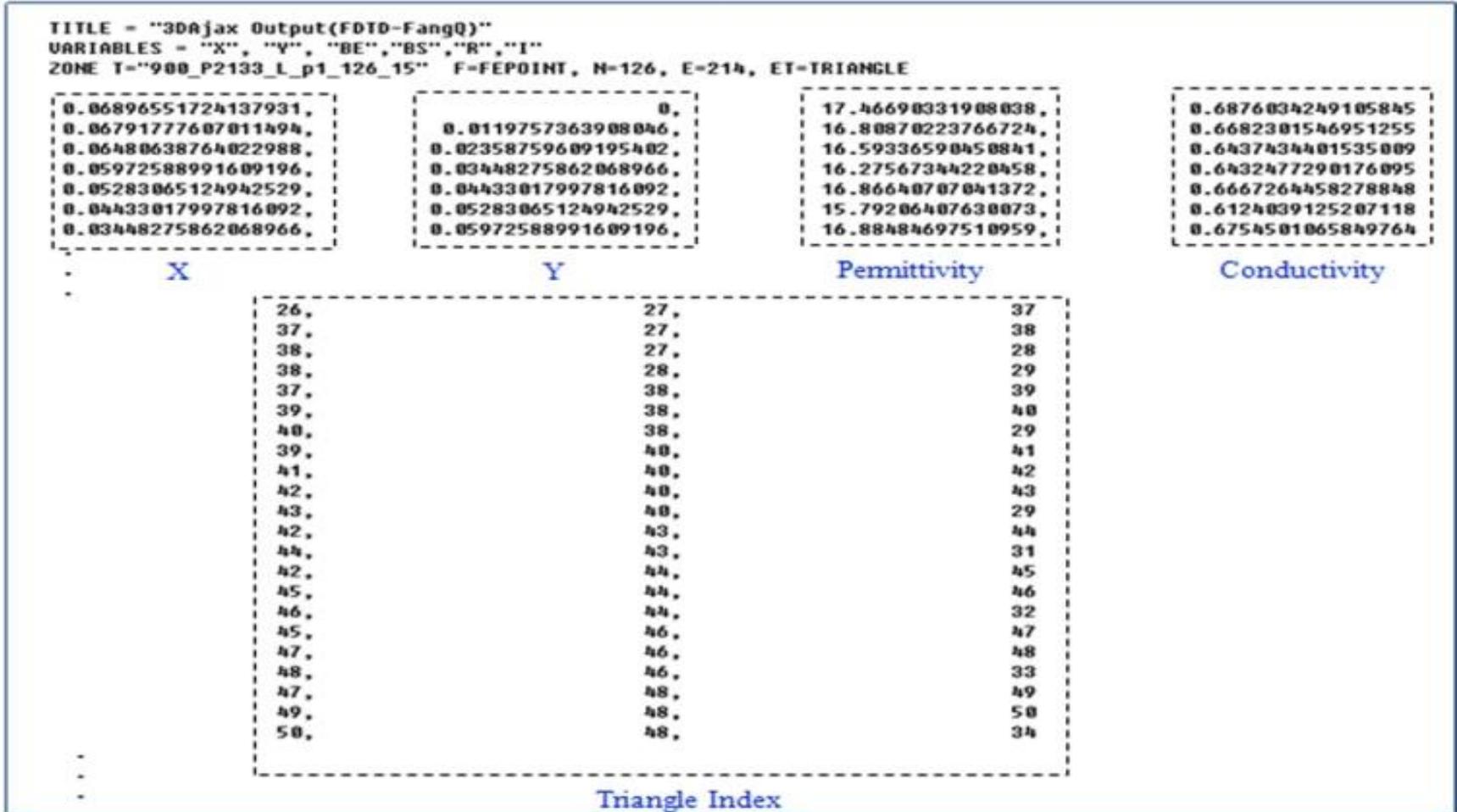
- **Geometric Data Type**
 - **Point(0D)** --- OK in X3D
 - **Line Segment(1D)** --- OK in X3D
 - **Face(2D)** --- OK in X3D
 - **Tetrahedron (3D)** --- Not in X3D
- **A set of sliced planes**
- **A specific sliced data**
 - **A set of points, each point has (x,y)-coordinates, permittivity, conductivity**
 - **A set of triangles, each triangle is represented into indexes of its points**

Geometric Medical Data (3/5)

- **Geometric Medical Data Type**
 - **A set of sliced planes**
 - **A set of points, each point has (x,y) -coordinates, permittivity, conductivity**
 - **A set of triangles, each triangle is represented into indexes of its points**
 - **A set of tetrahedra**
 - **A set of points, each point has (x,y,z) -coordinates, permittivity, conductivity**
 - **A set of tetrahedra**
 - **Each tetrahedron is represented into indexes of four points**

Geometric Medical Data (4/5)

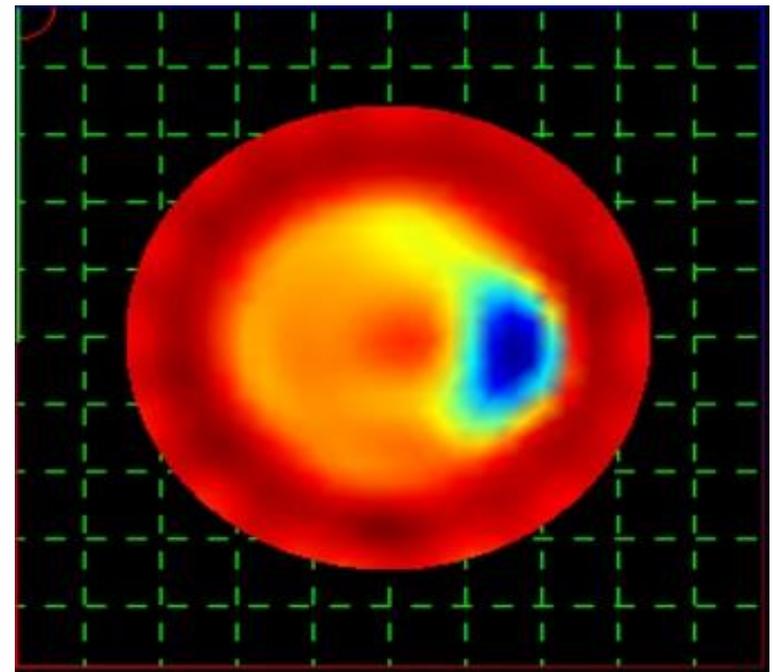
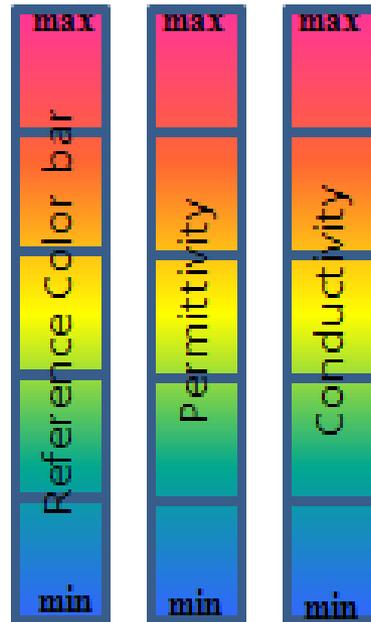
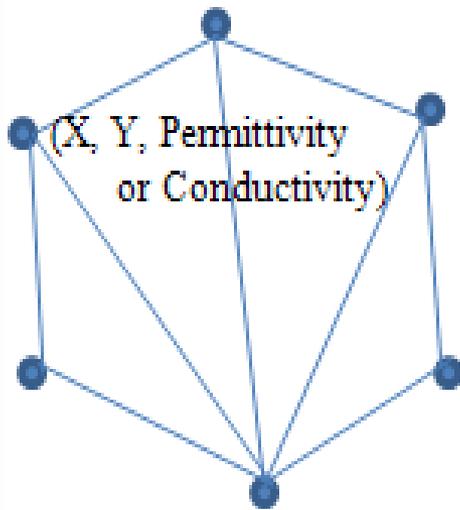
- Geometric Medical Data Example of a sliced plane



Geometric Medical Data (5/5)

- **Geometric Medical Data Example of a set of tetrahedra**
 - **A Point: x y z**
 - **A Tetrahedron: Node1 Noode2 Node3 Node4**
 - **Intensity 1: for all points**
 - **Intensity 2: for all points**
 - **Intensity 3: for all points**

Visualization of 2D Geometric Medical Data (1/2)



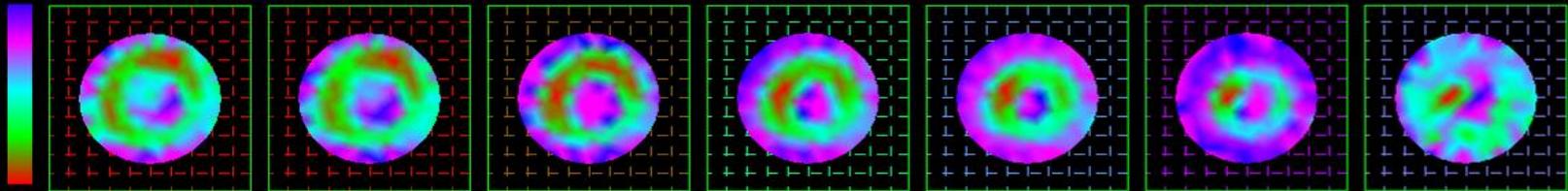
Position & color mapping

Give several colors for visualizing permittivity and conductivity into their corresponding colors

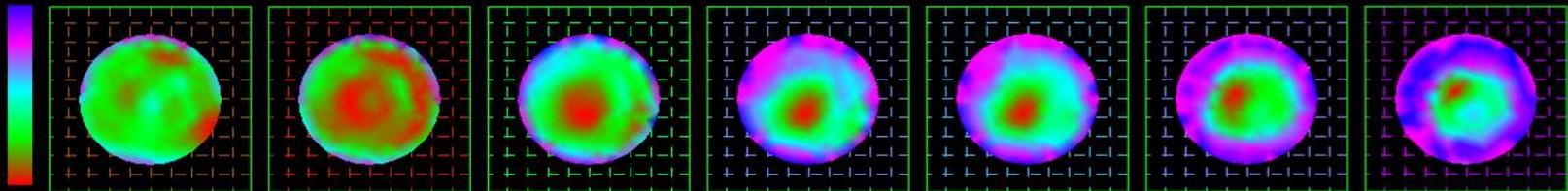
Visualization of 2D Geometric Medical Data (2/2)

Patient: 2133, Exam Date: 090904
Frequency: 900 MHz, Side: L, MeshID: 126
Iteration number 10/10

Permittivity

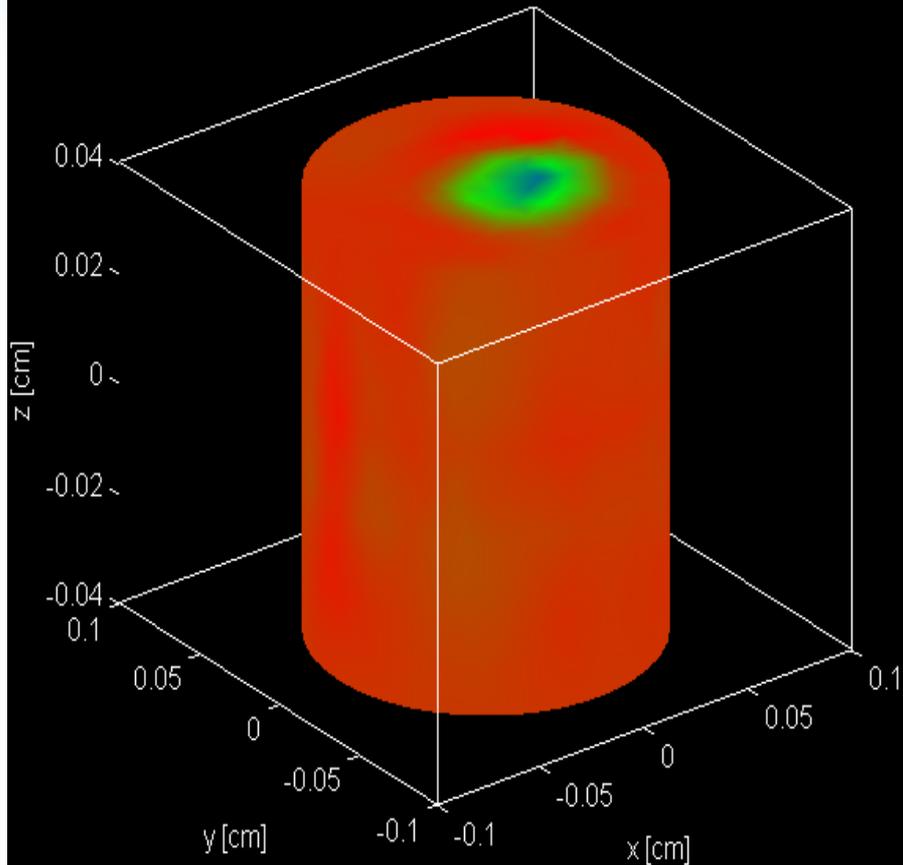


Conductivity

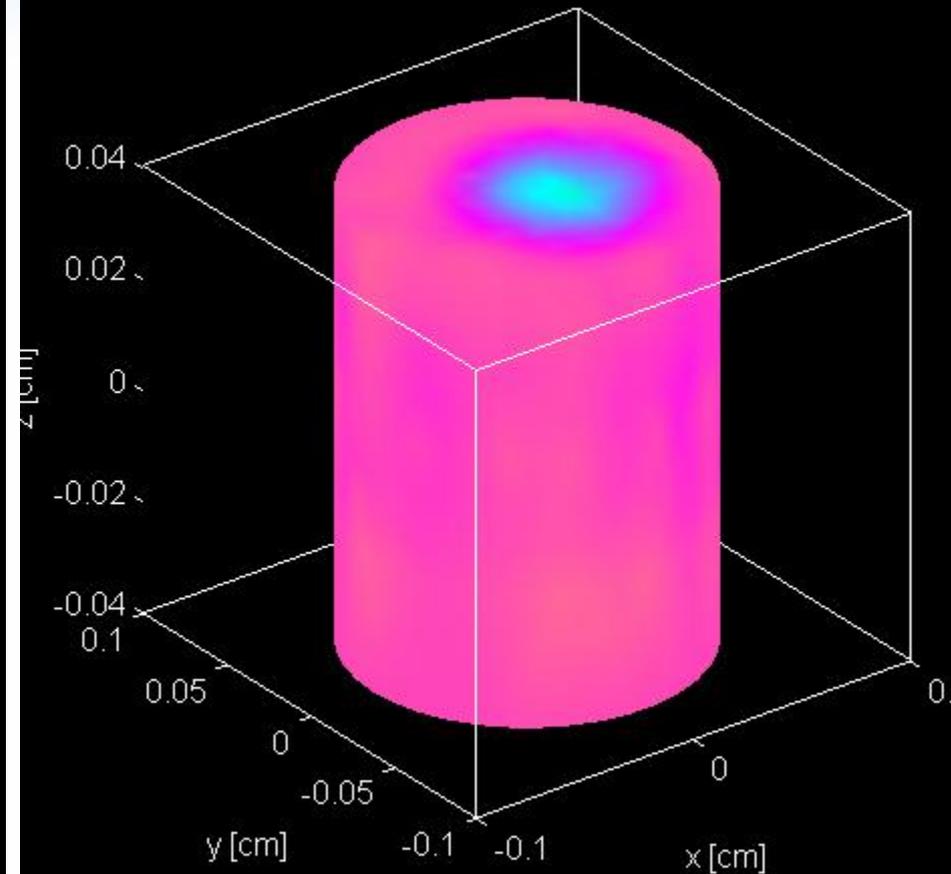


Visualization of 3D Geometric Medical Data

3D sphere -- Conductivity



3D sphere -- Permittivity



X3D Spec. (1/2)

Volume data for a set of 2D geometric data

- **Description for 2D geometric medical data in a sliced plane**
 - **A set of 2D points**
 - **Intensities of each 2D point**
 - **A triangle (indexes of 3 points)**
 - **A set of triangles**
- **Description for a volume**
 - **A set of 2D geometric data**

X3D Spec. (2/2)

A set of 3D geometric tetrahedra

- **Description of a volume**
 - A set of 3D points
 - Intensities for each 3D point
 - A tetrahedron (indexes of 4 points)
 - A set of tetrahedra
- **Geometric 3D Components**
 - Support Cone, Sphere, Cylinder in X3D
 - **Tetrahedron or a set of tetrahedra is not specified into X3D**

Conclusion

- **Geometric medical data can be represented into 3D medical data with **low overhead****
- **Colors can be visualized in geometric medical data**



Thank You