

# 4D Echo Particle Image Velocimetry Reconstruction of Cardiac Flows

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## BRIEF DESCRIPTION

Echo Particle Image Velocimetry (PIV) is a non-invasive ultrasonic technique used to image blood flow in patients. Particles that may be used as flow tracers with PIV include currently FDA approved contrast agents.

Currently, 2D blood flow information obtained by echocardiography is widely used to diagnose cardiac dysfunction. While this 2D echocardiography method is useful, it does not provide sufficient accuracy for characterizing complex 3D flows in the heart. For example, it is difficult to accurately image flow patterns in the right heart or hearts of patients with congenital defects or quantify mitral regurgitation.

Researchers at the University of California, Irvine have developed a new method for multi-planar 3D reconstruction of 2D Echo Particle Image Velocimetry (PIV) data. This method may be used to image and assess blood flows from the heart chambers in real-time therefore allowing 4D imaging of blood flows in the heart.

## SUGGESTED USES

Improve clinical diagnosis of cardiac diseases, and patient specific modeling.

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,345,132	07/09/2019	2013-642

## TESTING

This imaging method has been tested in a pulsatile heart-flow simulator. It is now being tested in clinics.

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## OTHER INFORMATION

## KEYWORDS

Particle image velocimetry, Ultrasound, Echocardiography, Echocardiogram, Diagnosis, Cardiovascular diagnosis, Diagnostic tool, Diagnostic imaging, Medical imaging, 4D, 3D, three-dimensional, Velocity vector field, Velocity profile, Flow field, Flow sensitive, 4D Flow, 4D-Flow, Non-invasive, Portable, Inexpensive, Matrix array transducer, 3D matrix array transducer, Matrix array probe, 3D ultrasound probe, 3D ultrasound transducer

## CATEGORIZED AS

- » Imaging
- » 3D/Immersive

- » Medical
- » Software
- » **Medical**
  - » Diagnostics
  - » Disease:  
Cardiovascular and  
Circulatory System
- » **Research Tools**
  - » Vectors
- » **Sensors &  
Instrumentation**
  - » Medical
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