# Intrinsic Navigation from Velocity-Encoding Gradients in Phase-Contrast MRI

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## Technology description

Time-resolved phase contrast MRI (4D flow) can quantify cardiac function and flow. The technique may even permit complex anatomical assessment, thus comprising a comprehensive exam in a single scan. Unfortunately, artifacts from respiratory motion compromise this ability. Therefore, we developed a simple method to measure motion using readily available navigation information from the velocity-encoding gradients without any significant modification to conventional sequences.

## Additional Information

**Related Materials**

Intrinsic Navigation from Velocity-Encoding Gradients in Phase-Contrast MRI

**Additional Technologies by these Inventors**

Screen-printed Flexible MRI Receive Coils

Image-guided Improvements for High-intensity Focused Ultrasound Systems

## Application area

Can be used in conjunction with any type of phase-contrast MR imaging scheme and any type of reconstruction strategy.
Allows for high-quality images to be reconstructed from exams with long acquisition times and other types of exams that are sensitive to motion defects.
Can be used for any part of the body that requires assessment using phase-contrast imaging. It is especially useful in cases when patients have difficulty holding still for long time periods.
For longer scans (>1 min), breath-holds are no longer possible and respiratory motion must be considered. With the navigation technique, this imaging modality can be made accessible to a wider patient population.

## Advantages

In conventional phase-contrast sequences, no alterations to the sequence timing or gradient waveform are needed.
Navigator information is available for every repetition time and is naturally synchronized to the acquired imaging data.
For multi-direction phase-contrast imaging different navigators are available to describe multi-dimensional linear motion.
In conjunction with a with a high-density multi-channel coil receiver, each coil element provides spatial localization to the navigator signals.
The navigator measured can be used for motion compensation purposes or to prospectively gate the acquisition.
The method can be used for any sampling strategy (both Cartesian and non-Cartesian).

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