



# piStabilize v. 1.2

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Video Stabilizer for iMovie

PIXLOCK

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# Introduction

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piStabilize is a video stabilizer for iMovie. It reduces shaking and vibrations of video frames by smoothing fast motion typically being introduced by hand-held cameras.

piStabilize recognizes and compensates for shaky motion in any direction, which is most commonly horizontal and vertical translation, but also rotational shaking is properly handled. Through its automatic scene recognition, piStabilize can process multiple scenes in a single pass.

A common side effect of video stabilization is the appearance of margins. piStabilize fills them smartly with colors similar to those in the current video frame. This makes them less obvious. Furthermore, several zooming steps let you zoom up the video to cover margins. A smart dynamic zoom technique ensures that zoom is only applied where it is necessary. This minimizes image degradation due to zooming.

piStabilize utilizes a smart caching technique for computed motion within a clip, i.e. motion tracking is performed only once for a clip. This improves performance when reapplying stabilization very much.

piStabilize handles standard definition DV for NTSC and PAL format and the HD formats 1080i, 720p, both for PAL and NTSC.

## Requirements

piStabilize runs on Apple Macintosh computers with PowerPC or Intel processor. iMovie 5.0+ is required.

## Installation

First, you may need to download the piStabilize package from [www.pixlock.com](http://www.pixlock.com). In this package you'll find several files. Launch the included application "piStabilize Installer" and follow the instructions given there. With this installer you can install and uninstall the piStabilize plug-in as demo for evaluation purposes or fully enabled by additionally installing a license for piStabilize. You can purchase a license at [www.pixlock.com](http://www.pixlock.com).

# Applying piStabilize

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piStabilize is a filter effect and is applied just in the same way as other iMovie filters:

Launch iMovie and open your project. Then, select a movie clip in the timeline and specify a temporal selection if necessary. Now, you can switch to the effects panel and choose piStabilize from the video table. Click “Apply” and piStabilize performs rendering of the selected clip. It is recommended to begin with the default settings and evaluate the resulting movie, before you change the parameters. When you apply stabilization to a certain segment of a clip the first time, this can take several seconds up to a few minutes, before frames can be actually rendered.

Video stabilization works by spatially transforming each frame of a clip in a way that the content appears more steadily. An inevitable and undesired side effect of these transformations is the occurrence of margins. piStabilize automatically fills these margins with colors similar to those at the border of the respective video frame. This may reduce the annoying effect of uniformly colored, jumping margins, but this is not considered as the complete solution to the margin problem. In addition, you will likely find the best solution in applying a zoom to the video. In the following paragraphs piStabilize’s parameters are explained.

## **Stabilize**

The parameter “Stabilize” controls the strength of stabilization. It specifies the “inertia” of the stabilizer, i.e. how fast the stabilizer will follow camera motion, or, on the other hand, which shaking speed the stabilizer will compensate for. For low values, the stabilizer compensates for fastest shaking from frame to frame only, and the higher the stabilize value, the more inert the stabilizer will follow the camera motion.

Higher values result in smoother motion and in a better stabilization effect. On the other hand, image margins become larger for higher values. In most cases you need to find a good compromise between good stabilization and small margins.

By default, stabilization is applied to shaking in horizontal, and vertical direction, and with respect to rotation. You can enable or disable stabilization regarding all directions separately. See “Customization” below for details.

## **Zoom**

Stabilization yields undesired margins, and one method for treating margins is zooming up each frame. The Zoom parameter lets you zoom up in order to cover a certain portion of the movie area. By choosing an appropriate value, you can ensure that a certain spatial portion is fully covered by the current frame (e.g. 90 % for TV safe and 80 % for Title safe areas). Areas beyond the specified region are filled by colors similar to those in the current video frame.

piStabilize recognizes four distinct values for zooming. When the slider is at the very left position (“None”), no zoom is applied, other values in the left half of the slider result in a zoom to cover the Title safe region. For slider positions in the right half, a zoom is applied to fully cover the TV safe area. If you cannot tolerate any margins, you can apply full zoom by moving the slider to the very right position.

### **Smart Zoom**

In order to fulfill the zoom option as specified by the Zoom parameter, video frames need to be magnified individually. In general, a frame-wise magnification would provide undesired results. On the other hand, a constant magnification for all frames would overly sacrifice image quality due to magnification.

Smart Zoom introduces a compromise in this respect by magnifying frames only as much as necessary, but it also ensures that magnification can change only slowly over time. This provides a smooth transition between frames where strong magnification is to be applied and those, which require only little or no magnification.

The higher this value (“Slow”), the more slowly the zoom can change over time. A lower value (“Fast”) allows for fast changes from frame to frame according to the Zoom value. The default value can be considered as a reasonable value for most cases, but the optimum depends on the shakiness of your video. Fast values can result in an undesired visual “pumping” effect. In such a case you might need to slow down zooming. Choosing an appropriate value is a compromise between maximum smoothness and best image quality at low magnification - where possible. Note, that this parameter can take effect only, when there is a Zoom value other than “None” specified.

### **Fade In/Out**

In order to smooth the transition between stabilized and non-stabilized segments, you can apply fade-in/out. Then, stabilization and zooming effects are gradually applied at the beginning and the end of a selection.

### **Cache**

Video stabilization generally consists of two distinct operations, motion tracking and rendering of stabilized frames. Motion tracking can be rather time consuming, but piStabilize employs a smart caching technique, which preserves any motion data that has been computed for a given video clip. As a result, motion tracking is usually performed only once for a certain segment of a clip. This improves performance very much, when you reapply video stabilization to a clip.

Preview is only possible for clip segments where tracking data is already available in the cache. Normally, you don’t have to care for the motion data cache at all, but there are a few situations where the cache can get disturbed, e.g. when you trim a movie. In such a case, video stabilization evidently does not work properly, and you need to reset the cache manually by clicking on “Reset Cache”. For this reason it is recommended to trim a clip before you apply piStabilize. Also, you should apply piStabilize before you apply any other effects.

Note: Resetting the cache is only possible, when piStabilize is not busy with rendering. The cache is also emptied, when you quit iMovie.

## How to Proceed

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To find the best combination of parameters, it may be helpful to test with a small portion of your movie where shaking is typical for this movie. Later, you can apply the optimum settings to a larger segment.

First, you should adjust the “Stabilize” parameter. It is recommended to choose the lowest value, which still delivers smooth motion in the resultant video. This ensures that margins are as small as possible.

Then, you can specify the “Zoom” value. The most appropriate value depends on where the movie shall be shown. If you want to play it on a TV, it should be sufficient to zoom up to the TV safe area, as TVs usually only show this area of your video. For presentation on a computer screen you might need to zoom to Full size.

Finally, you need to check how fast zooming may change over time. The best value for “Smart Zoom” depends on the characteristics of motion in your movie. If you encounter some kind “pumping”, you may need to slow down the zoom.

# Customization

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iMovie effects have a rather restricted user interface, but there are some more parameters regarding video stabilization, which you might find useful in some cases. These parameters are specified in a file within the piStabilize bundle. You find the piStabilize bundle at /Your Folder/Library/iMovie/Plugins/-piStabilizeXX.bundle. Click on this file while pressing the “Control” key, and a context menu pops up. Choose the menu item entitled “Show Package” or similar, and double-click on the file /Contents/Resources/Definitions.plist. In this property list there are a few parameters, which you can edit. After you have completed editing, you need to save the file, so piStabilize can recognize the new settings. It’s not necessary to restart iMovie.

## Margin

As explained above, piStabilize fills missing video areas by reproducing border pixels. Many cameras produce borders with constant pixel value, e.g. black or white. Their width can vary from zero to several pixels. Without cropping these margins, piStabilize would reproduce these constant pixel values and thus fill missing parts with this color.

By default, piStabilize crops video frames by 4 pixels on any side to avoid this effect. If your camera produces wider margins, you should increase the “Margin” value on the related side, or you can decrease the cropping width to improve image quality.

## Stabilize

piStabilize analyzes camera motion with respect to horizontal and vertical direction, and with respect to rotation and zoom. By default, zoom motion is not considered for stabilization, because mostly there is no necessity to stabilize along this direction, but it can introduce undesired effects when enabled. However, for special purposes, you can enable all directions separately and preserve shaking in a certain direction if desired.