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Sapia et al.

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- [54] **METHOD AND APPARATUS FOR THREE-DIMENSIONAL DECONVOLUTION OF OPTICAL MICROSCOPE IMAGES**
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[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

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[57] ABSTRACT

An adaptive structure of a Wiener filter is used to deconvolve three-dimensional wide-field microscope images for the purposes of improving spatial resolution and removing out-of-focus light. The filter is a three-dimensional kernel representing a finite-impulse-response (FIR) structure requiring on the order of one thousand (1000) taps or more to achieve an acceptable mean-square-error. Converging to a solution is done in the spatial-domain and therefore does not experience many of the problems of frequency-domain solutions. Alternatively, a three-dimensional kernel representing an infinite-impulse-response (IIR) structure may be employed. An IIR structure typically requires fewer taps to achieve the same or better performance, resulting in higher resolution images with less noise and faster computations.

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- [52] **U.S. Cl.** **359/559**; 382/260; 382/263; 382/210; 382/254; 382/255
- [58] **Field of Search** 359/559, 563; 364/604, 724; 367/46; 235/152; 382/270-272, 260-265; 333/18

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14 Claims, 19 Drawing Sheets

