



US006021241A

United States Patent [19]

[11] **Patent Number:** **6,021,241**

Bilbro et al.

[45] **Date of Patent:** **Feb. 1, 2000**

[54] **SYSTEMS AND METHODS FOR USING DIFFRACTION PATTERNS TO DETERMINE RADIATION INTENSITY VALUES FOR AREAS BETWEEN AND ALONG ADJACENT SENSORS OF COMPOUND SENSOR ARRAYS**

5,465,284 11/1995 Karellas 378/62
5,550,380 8/1996 Sugawara et al. 250/370.11

OTHER PUBLICATIONS

[75] Inventors: **Griff Luhrs Bilbro; Wesley Edwin Snyder**, both of Raleigh, N.C.;
Anthony Zilic, King George, Va.

K.D. Möller, *Optics*, University Science Books, pp. 127–176 (1988).

[73] Assignee: **North Carolina State University**, Raleigh, N.C.

Primary Examiner—Phan T. H. Palmer
Attorney, Agent, or Firm—Myers Bigel Sibley & Sajovec, P.A.

[21] Appl. No.: **09/118,745**

[57] **ABSTRACT**

[22] Filed: **Jul. 17, 1998**

An array of optical fiber bundles includes one or more diffractive elements positioned above gaps between adjacent bundles. Incident radiation produces mathematically determinative diffraction patterns on the respective input faces of the adjacent bundles. Radiation intensity values for areas between and along the abutting edges of adjacent optical fiber bundles can be determined using the diffraction patterns. These intensity values can be assigned to other pixels so that precise, seamless images can be reconstructed.

[51] **Int. Cl.⁷** **G02B 6/34**

[52] **U.S. Cl.** **385/37; 385/115; 385/116; 385/10**

[58] **Field of Search** 385/9, 10, 37, 385/115, 116, 119, 120, 121

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,859,012 8/1989 Cohn 385/115 X

27 Claims, 10 Drawing Sheets

