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(72) Inventors; and
(71) Applicants: **ZHENG, Yahong, Rosa** [CA/US]; c/o Missouri University of Science & Technology, 900 Innovation Drive, Suite 145, Rolla, MO 64501 (US). **DUAN, Weimin** [—/US]; c/o Missouri University of Science & Technology, 900 Innovation Drive, Suite 145, Rolla, MO 64501 (US). **XIAO, Chengshan** [—/US]; c/o Missouri University of Science & Technology, 900 Innovation Drive, Suite 145, Rolla, MO 64501 (US).

(74) Agent: **MEYER, Bryan, E.**; Shook, Hardy & Bacon, LLP, 2555 Grand Blvd., Kansas City, MO 64108 (US).

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(54) Title: IMPROVED TURBO RECEIVERS FOR SINGLE-INPUT SINGLE-OUTPUT UNDERWATER ACOUSTIC COMMUNICATIONS

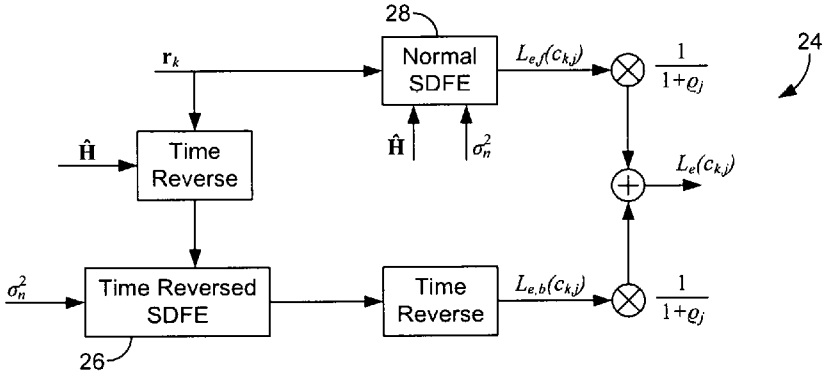


FIG. 4

(57) Abstract: Systems and methods for underwater communication using a SISO acoustic channel. An acoustic receiver may receive a signal comprising information encoded in at least one transmitted symbol. Using a Bi-SDFE, the at least one transmitted symbol is estimated. The Bi-SDFE may include a SDFE and a time-reversed SDFE that each output bit extrinsic LLRs, which are combined into combined bit extrinsic LLRs. The estimated symbol is then mapped to the combined bit extrinsic LLRs, the result of which is de-interleaved. Iterative bit extrinsic LLRs are generated with a MAP and/or soft-decision decoder using the mapped, combined bit extrinsic LLRs as *a priori* LLRs for the Bi-SDFE in another iterative estimation. The iterative bit extrinsic LLRs are interleaved and transmitted for use by the Bi-SDFE in another iterative estimation. After a plurality of iterations, a hard decision of the transmitted symbol is generated with the MAP and/or soft-decision decoder.

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History Document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See Search History Document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,813,219 B1 (Blackmon et al.) 02 November 2004 (02.11.2004), entire document, especially col. 4, ln. 45 to col. 5, ln. 4; col. 5, ln. 48-65	17-20
Y --- A	US 2005/0018794 A1 (Tang et al.) 27 January 2005 (27.01.2005), entire document, especially para. [0029], [0032]	17-20 --- 16
A	US 8,542,724 B1 (Blackmon et al.) 24 September 2013 (24.09.2013), entire document	1-20
A	US 6,819,630 B1 (Blackmon et al.) 16 November 2004 (16.11.2004), entire document, especially col. 5, ln. 33 to col. 6, ln. 14; col. 6, ln. 47 to col. 7, ln. 12	1-20
A	US 2012/0027070 A1 (Beidas) 02 February 2012 (02.02.2012), entire document, especially para. [0075], [0083], [0089]	1-20
A	"Turbo Equalization for Single-Carrier Underwater Acoustic Communications" Zheng et al. November 2015. IEEE Communications Magazine, Volume: 53 , Issue: 11, Pages: 79 - 87.	1-20

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