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(54) Title: GENERATOR-FAULT-TOLERANT CONTROL FOR A VARIABLE-SPEED VARIABLE-PITCH WIND TURBINE

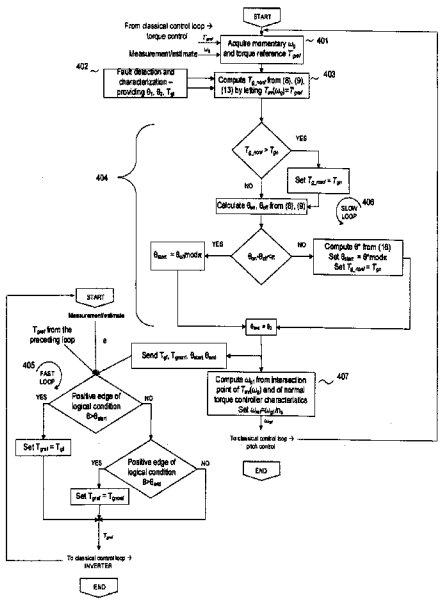

Fig. 16

(57) Abstract: Present invention relates to a fault-tolerant control scheme for variable-speed variable-pitch wind turbines with an inverter-fed generator. Invention is focused on generator faults that can be well characterized with machine flux path areas where the generator torque should be limited to prevent fault propagation and with the maximum safety torque value in that path areas. An extension of the classical two-loop control structure of variable-speed variable-pitch wind turbines is proposed which ensures that the fault is fully respected in operation and that power delivery under fault is deteriorated as less as possible compared to healthy machine conditions. The first step is the acquisition of the momentary angular velocity of the generator cog and the associated required generator torque T_{gref} (401). Upon detection of a fault, the fault detection algorithm establishes the location of the fault and the fault severity providing the location in terms of angles θ_1, θ_2 related to the rotating magnetic flux frame, and the maximum allowed torque T_{gf} at the fault location (step 402). It is understood that the fault may occur on the stator or the rotor of the generator. In the fault-managed state, the generator torque will be modulated to exhibit reduced torque T_{gf} around the location of the fault and an increased torque T_{g_nonf} in all other areas of the circumference of the rotating magnetic flux.

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ADD.

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B. FIELDS SEARCHED

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010/277137 A1 (ZHAO HAIQI [CN] ET AL) 4 November 2010 (2010-11-04) paragraph [0022]; figures 2,3 paragraphs [0033] - [0035] -----	1-9
A	CHRISTIAN KRAL ET AL: "Phenomenon Rotor Faultâ Multiple Electrical Rotor Asymmetries in Induction Machines", IEEE TRANSACTIONS ON POWER ELECTRONICS, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 25, no. 5, 1 May 2010 (2010-05-01), pages 1124-1134, XP011297937, ISSN: 0885-8993 page 1128; figure 5 -----	1-9

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/	Authorized officer
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 2009/243647 A1 (CHARI MADABUSHI VENKATAKRISHNAMA [US] ET AL) 1 October 2009 (2009-10-01) paragraphs [0018] - [0025], [0035]; figures 1-3 -----	1-9
A	EP 0 552 991 A2 (ONTARIO HYDRO [CA] ONTARIO HYDRO [JP]) 28 July 1993 (1993-07-28) column 1, line 29 - column 3, line 3; figures 6,7 column 9, line 50 - column 11 -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

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