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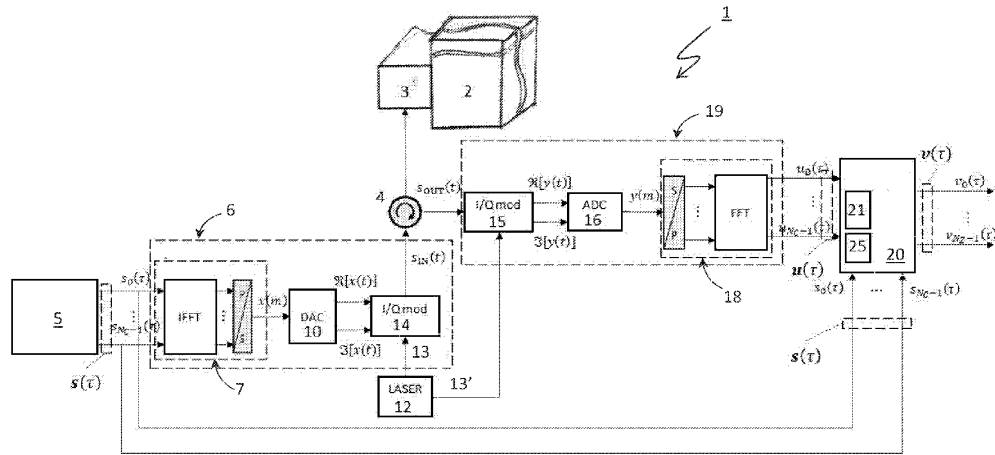


Fig. 1

(57) Abstract: System (1) and method for monitoring by optical fiber (3) for the measurement of vibrations an object /structure (2). The system comprises the optical fiber (3) associated with the object/ structure (2) and having one end connected to a circulator (4) and a terminated opposite end, a source (5) of symbols emitting sequence of N_S input signals ($s_i = [0, \dots, N_S - 1]$) and which is configured to generate an input vector ($s(t)$) with N_c input signals ($s_n(t) = [0, \dots, N_c - 1]$), a multi-carrier OFDM modulation block (6) adapted to modulate a light beam (13) emitted by a laser source (12) by means of an OFDM modulating signal to determine a sensing signal ($s_{IN}(t)$) with N_c subcarriers, said modulating signal OFDM being generated on the basis of the input vector ($s(t)$); the circulator (4) being adapted to send the sensing signal ($s_{IN}(t)$) to the optical fiber (3) and to receive

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a backscattered signal $S_{OUT}(t)$; an OFDM demodulation block (19) which receives a second light beam of intensity proportional to said light beam (13) to demodulate the backscattered signal ($S_{OUT}(t)$) determining an output vector ($u(\tau)$) with N_c output signals ($u_n(\tau)$ $n= [0,...,N_c-1]$) which include backscattered symbols; a processing unit (20) that processes the output vector ($u(\tau)$) and the input vector ($s(\tau)$), on the basis of respective N_c reference vectors (R_n $n= [0,..., N_c-1]$) of said optical fiber (3), generating a deformation vector ($V(T)$) of said optical fiber (3), said N_c reference vectors (R_n $n=[0,...,N_c-1]$) being determined considering unperturbed conditions of said optical fiber (3).