

Patent Claims

1. A method for diagnosing a technical system, wherein deviations of values relating to at least n , with $n \geq 2$, variables for describing a current state of the technical system at a specific time from predefined values for describing a normal state are ascertained in order to infer a fault, characterized by the following method steps:

- a. performing a main component analysis of predefined values relating to the at least n , with $n \geq 2$, variables for describing the normal state of the technical system and ascertaining at least one main component of the n variables;
- b. predefining the at least one main component for describing the normal state of the technical system, wherein no more than x , with $1 \leq x < n$, main components of the n variables for describing the normal state are predefined;
- c. ascertaining the deviations of the values relating to the n variables for describing the current state of the technical system from the at least one predefined main component for describing the normal state in order to infer a fault.

2. The method as claimed in claim 1, characterized in that method steps a. and b. are carried out during a learning phase and method step c. is carried out during an operating phase.

3. The method as claimed in either of claims 1 and 2, characterized in that method step a. is carried out for each of m , with $m \geq 2$, different operating modes, wherein in method step b. the at least one main component for describing the normal state is predefined on the basis of a current operating mode.

4. The method as claimed in one of claims 1 to 3, characterized in that the n variables describe the same

physical quantity and/or in that the values of the n variables describe the state of the same component of the technical system.

5. The method as claimed in claim 1, characterized in that only the main components that together cover at least 70% of the total variance of the values of the n variables for describing the normal state are predefined.

6. The method as claimed in one of claims 1 to 4, characterized in that in method step b. only the dominant main component is predefined.

7. The method as claimed in one of claims 1 to 6, characterized in that in a method step d. that follows method step c. the extent of the deviation is taken as a basis for inferring a predefined fault.

8. The method as claimed in one of claims 1 to 7, characterized in that in method step c. the deviation is ascertained by ascertaining a distance of the values of the n variables for describing the current state from the at least one predefined main component for describing the normal state.

9. A computer program product comprising instructions that, when the program is executed by a suitable mobile terminal, cause said terminal to carry out the method as claimed in one of claims 1 to 8.

10. A data carrier on which the computer program product as claimed in claim 9 is stored.

11. An apparatus comprising a technical system and an evaluation unit, wherein the evaluation unit is suitably designed to:

- perform a main component analysis of predefined values relating to n , with $n \geq 2$, variables for describing a normal state of the technical system and ascertain at least one main component of the n variables;
- predefine the at least one main component but no more than x , with $1 \leq x < n$, main components of the n variables for describing the normal state of the technical system;
- ascertain deviations of values relating to the n variables for describing a current state of the technical system from the at least one predefined main component for describing the normal state in order to infer a fault.

12. The apparatus as claimed in claim 11, characterized in that the technical system is a rail vehicle.