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**Stability evaluation of active magnetic bearings**

主动磁悬浮轴承稳定性评价

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## Foreword

This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting is scheduled.

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Stability evaluation of active magnetic levitation bearings

## 1 Scope

GB/T 47113-2026 is the Chinese national standard covering whether a magnetic bearing's control loop is stable - the sensitivity function and its peak, the margins, the behaviour through the rotor's critical speeds and under disturbance, on a bearing that holds a shaft up only as long as its feedback keeps working. First edition, 17,000 words, with GB/T 47117-2026 on stator inspection. It was issued on 28 January 2026 and has been in force since 1 August 2026, as a first edition. The document is under the responsibility of the Standardization Administration of China. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document specifies the stability evaluation requirements and methods for active magnetic levitation bearing-supported rigid rotor systems, and classifies stability through frequency domain analysis. Qualitative rating describes the testing methods and evaluation criteria. This document applies to the stability evaluation of a rigid rotor system supported by an active magnetic levitation bearing in rotating machinery under given operating conditions. This document applies to rigid rotor systems supported by active magnetic levitation bearings, where rotor vibration displacement is the control objective (hereinafter referred to as "active magnetic levitation bearings"). For active magnetic levitation bearing systems that use other variables as control targets, please refer to this document for implementation.

Note. This document serves as a reference for the stability evaluation of a flexible rotor system supported by an active magnetic levitation bearing under given operating conditions. This document does not cover rotor overcritical rotation. The problem of vibration control at high speeds.

## 2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are listed below. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 2900.56 Electrical Engineering Terminology - Control Technology

## GB/T 46078 Terminology for Magnetic Levitation Power Technology

### 3 Terms and Definitions

The terms and definitions defined in GB/T 2900.56 and GB/T 46078, as well as the following terms and definitions, apply to this document.

**3.1 stability** When subjected to an initial offset or disturbance that is sufficiently small relative to the rest position, the system state variables and output variables can be kept at that position sufficiently. System characteristics within a small neighborhood. [Source: GB/T 2900.56-2008, 351-21-30]

**3.2 Stability of active magnetic bearings** Under given operating conditions, the dynamic response of a rotor system supported by an active magnetic levitation bearing can recover after being disturbed in equilibrium. The ability to return to the original equilibrium state or converge to a new equilibrium state.

**3.3 Closed-loop transfer function** For a linear time-invariant system under closed-loop control with zero initial conditions, the Laplace transform of the output variable and the Laplace transform of the corresponding input variable are... The ratio of the Gaussian transform.

**Note.** The closed-loop control process of the active magnetic levitation bearing system based on displacement control is shown in Figure

1. Its closed-loop transfer function  $G_c$  is the ratio of the displacement measurement signal  $V_3$  to the reference signal  $V_1$ . The ratio of the Laplace transform of the displacement signal  $V_3$ , i.e.,  $G_c(s) = V_3(s)/V_1(s)$ . In the formula.  $G_c$  -- Closed-loop transfer function;  $s$  -- Laplace operator.