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# Wed-Af-Po3.17-02 [30]: Cyclic behavior of Wendelstein 7-X magnet system during first two phases of operation

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Cyclic behavior of Wendelstein 7-X magnet system during first two phases of operation
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The sophisticated large magnet system of Wendelstein 7-X (W7-X) stellarator has been operated during first two experimental campaigns at the Max-Planck-Institute for Plasma Physics in Greifswald, Germany, for roughly 13 months. Its 70 superconducting coils (NbTi CCIC) are extraordinary not only due to complex 3D shapes of 50 non-planar coils, but also due to a non-linear support system.
In addition, five big resistive coils with the aim to correct W7-X error fields are installed on the outer cryostat and use rubber pads in their supports to compensate thermal expansion of the coils.
The unique feature of the experimental device is the extended set of temperature and mechanical sensors to monitor the system behavior and to compare it with finite element predictions.
Several cooldown/warming up and thousands of electromagnetic cycles with different loading patents and with up to 70% design load magnitude have been performed by the system successfully.
The paper focus is on the structural cyclic behavior of the W7-X magnet system. Several related issues such as
bolts and rubber pads prestress degradation,
support slippage development,
evolution of mutual coil displacement,
loading path dependence of stress levels,
sliding weight support (cryoleg) adjustment,
and sensor failure
are addressed.
Lessons learned so far are also briefly summarized.

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