

ISO 27852:2016-07 (E)

Space systems - Estimation of orbit lifetime

Contents		Page
Foreword		iv
Introduction		v
1	Scope	1
2	Normative References	1
3	Terms, definitions, symbols and abbreviated terms	1
3.1	Terms and definitions	1
3.2	Symbols	3
3.3	Abbreviated terms	4
4	Orbit lifetime estimation	4
4.1	General requirements	4
4.2	Definition of orbit lifetime estimation process	4
5	Orbit lifetime estimation methods and applicability	5
5.1	General	5
5.2	Method 1: High-precision numerical integration	6
5.3	Method 2: Rapid semi-analytical orbit propagation	7
5.4	Method 3: Numerical table look-up, analysis and fit formula evaluations	7
5.5	Orbit lifetime sensitivity to sun-synchronous	7
5.6	Orbit lifetime statistical approach for high-eccentricity orbits (e.g. GTO)	7
6	Drag modelling	13
6.1	General	13
6.2	Atmospheric density modelling	13
6.3	Long-duration solar flux and geomagnetic indices prediction	14
6.4	Approach 1: Monte Carlo random draw of solar flux and geomagnetic indices	15
6.5	Method 3: Equivalent constant solar flux and geomagnetic indices	19
6.6	Atmospheric density implications of thermospheric global cooling	23
7	Estimating ballistic coefficient (CDA/m)	23
7.1	General	23
7.2	Estimating aerodynamic force and SRP coefficients	24
7.2.1	Aerodynamic and solar radiation pressure coefficient estimation via a "panel model"	24
7.3	Estimating cross-sectional area with tumbling and stabilization modes	27
7.4	Estimating mass	28
Annex A (informative)	Space population distribution	29
Annex B (informative)	25-year lifetime predictions using random draw approach	32
Annex C (informative)	Solar radiation pressure and 3rd-body perturbations	37
Annex D (informative)	Sample code for drag coefficient estimation via panel model	39
Bibliography		41