of DOE, provides tolerance sensitivity, and the second one, applies uniform DOE to generate tolerance assignments with representativeness and uniformity, against capacity instability and manufacturing complexity. The flowchart of the tolerance synthesis applying both NTM and uniform DOE is illustrated in Fig. 2.

Building on the above advances, this paper focuses on tolerance analysis and synthesis towards application in the L/R mechanism. The reminder of this article is organized as follows: Sec. 2 briefly introduces the structure and principle of the L/R mechanism; Sec. 3 completes accuracy modeling for the L/R mechanism, and conducts tolerance analysis with Halton-set based MC simulation; Sec. 4 details the tolerance synthesis procedures for the L/R mechanism and illustrates the practicability for a case study; Conclusions are drawn in Sec. 5.

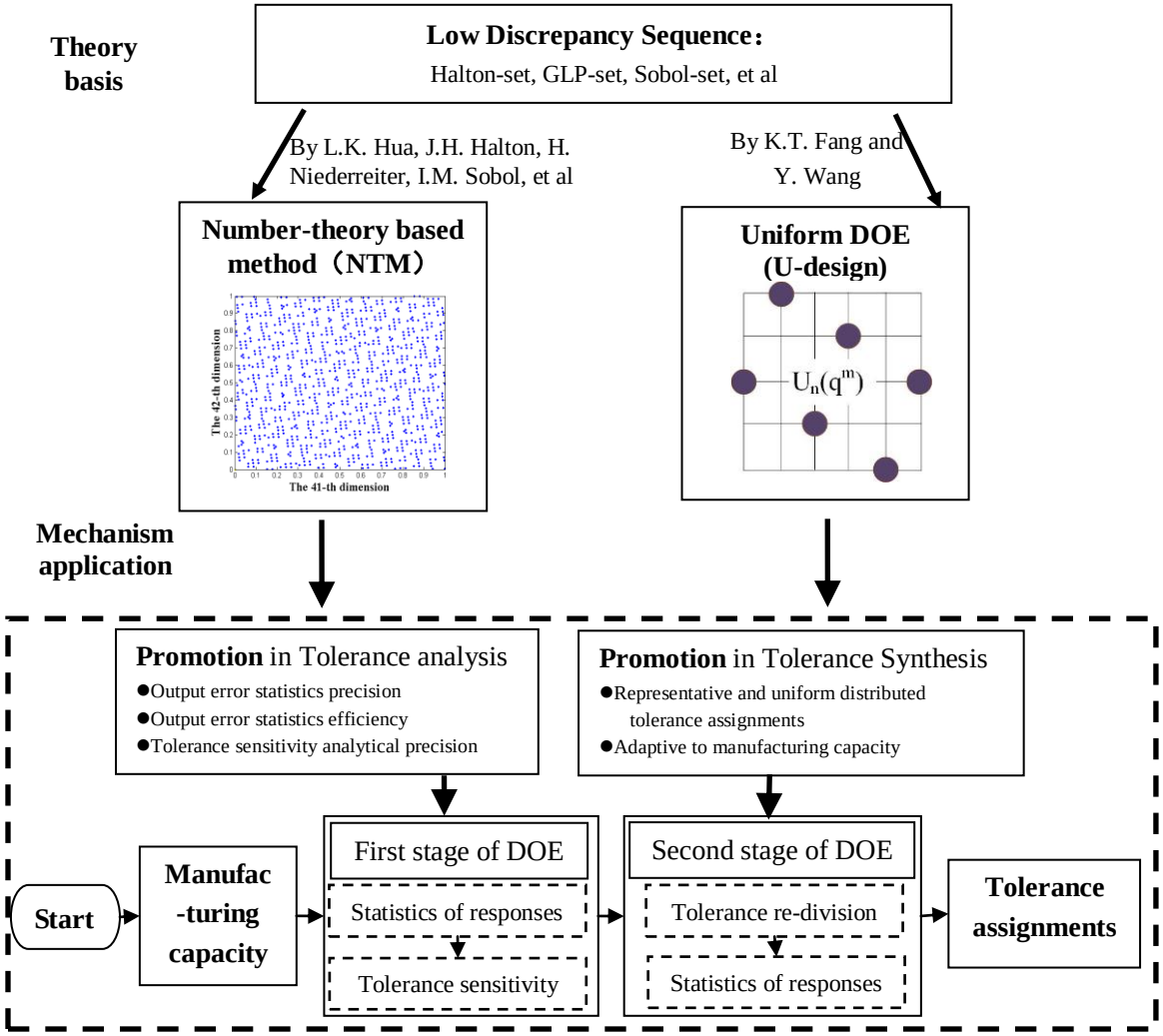

Figure 2. Flowchart of tolerance synthesis with both NTM and uniform DOE.

2 L/R mechanism description

The architecture of a L/R mechanism is illustrated in Fig. 3. The stepper motor on the backside, drives the bevel gear Z1, then revolve gears Z2 and Z3 that are connected together. Driven by a central gear Z4, four branches of gears rotate simultaneously, making four lead screws move forward as synchronous as possible for the locking gears Z5, Z6, Z7, and Z8. The SSMP is securely locked by