

## International Conference on History of Ancient Mathematics and Astronomy

In Memory of Professor Li Jimin (1938-1993)

### Algorithms in the mathematical sciences in the ancient world

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#### Algorithms in early China mathematical documents and their circulation

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*Reflections upon the Presentation of Parallel Algorithms Across the Astral and Mathematical Sciences in First-Millennium China*

**Abstract** – Most of what changes from one first-millennium *lì* 曆 procedure text to another are the ‘numbers’ (shù 數) and not the ‘procedures’ (shù 術) for calculating therewith—algorithms, for example, for finding the position of the mean sun at winter solstice or the hour of quarter moon. What changes do occur in the algorithms are generally cumulative and modular—something new is introduced, or something changed, within an otherwise stable framework of tables and algorithms stretching back as far as the first century CE. ‘Procedures’ tend to remain the same over time in terms of the specific algorithms and operations that they prescribe, but not their language, which varies considerably. In this talk, I shall examine parallel algorithms across *lì* procedure texts of the first-millennium CE to highlight the fluidness of the linguistic representation of algorithms within a very specific subculture of mathematics. Within *lì* literature, I shall discuss the ambiguity and historical evolution of the language of operations, especially ‘eliminate’ (chú 除, i.e. subtraction, series subtraction, modulo, or division), and I shall explore how procedure text is explained and cut-and-pasted. Beyond *lì* literature, I shall reflect upon the language, units, and context of parallel procedures within the genre of suàn 算 (‘calculation’) mathematics. The goal of this analysis is to provide positive evidence of synchronic and diachronic diversity in the algorithmic vocabulary of first-millennium Chinese sources for mathematics.