

## SAW Seminar: Mathematical practices in the context of the astral sciences

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*Glimpses of Karaṇapaddhati: A unique astronomical treatise*

**Abstract:** The term *karāṇa* is a homonym and can refer to different things in different branches of studies, not to speak of the variation in meaning that it can acquire depending upon the derivation of the word. However, all the different meanings of the word will in some sense be connected to ‘doing’ or ‘performing’. When employed in the context of astronomical works, the word refers to a class of texts that merely outline the computational procedures for planetary positions, supposedly in a much simplified form, without presenting any theoretical framework. As the term *paddhati* refers to a certain ‘method’ or ‘procedure’ adopted to achieve a defined purpose, the compound *Karaṇapaddhati*, as applied to the title of the text, may be translated as ‘procedure for composing *karāṇa*’ texts. This is a unique treatise in the Indian astronomical literature which aims at assisting astronomers in preparing *karāṇa* texts, by outlining the *paddhati* to be adopted. This text was composed by Putumana Somayajī, and scholars have estimated the period of composition to be around 1732 CE.

It is well known that the computation of longitudes of planets crucially depends upon the rates of their mean motion as well as that of their zodiacal and solar anomalies (*maṇḍa* and *śighra-kendras*). An accurate way of specifying them would involve ratios of large numbers (*mahāguṇakaras* and *mahāharas*), connected with a large period called *Mahāyuga* or thousand times that referred to as *Kalpa* (~ 4 billion years). The text *Karaṇapaddhati*, among other topics, discusses the techniques by which the ratios of large numbers can be reduced to small ones (*alpaguṇakaras* and *alpahas*) by way of expressing them as continued fractions. This reduction, done through a technique called *vallyupasamhara*, plays a key role in devising algorithms for generating the *vākyas* (mnemonics) for the true longitudes of the planets (including the sun and the moon).

Putumana Somayajī in his *Karaṇapaddhati* clearly displays his ingenuity in presenting different ways of doing *vallyupasamhara*. The verses in the text not only possess brevity and clarity, but also exhibit Putumana's adeptness in coming up with beautiful metrical compositions. A variety of meters, starting with *anuṣṭubh* (8 syllables per quarter) to *sragdharā* (21 syllables per quarter), have been judiciously employed by the author to compose verses which at times have a double meaning---literary and astronomical. During the talk, we will try to highlight some of these aspects of the text. We will also try to touch upon the special features of *vākya* system of computation of longitudes.