Mathematics of Seki Takakazu

Kenji Ueno

The Seki Kowa Institute of Mathematics, Yokkaichi University

Japanese mathematics of the Edo period started to develop into a new direction beyond Chinese classical mathematics when SEKI Takakazu (1645? - 1708) introduced a method to express algebraic equations of many unknowns (傍書法). Nevertheless, SEKI's mathematics was based on Chinese classical mathematics. Indeed SEKI studied the Chinese mathematical book "Yang Hui Suanfa" (楊輝算法) carefully and he even composed its revised version. We can find several evidences that SEKI was deeply influenced by the "Yang Hui Suanfa".

SEKI was the first mathematician of the East Asian cultural sphere who developed general theories of mathematics. For example, he founded a theory of equations of one known formulating rigorously Horner's method and more importantly the elimination theory of simultaneous equations of higher degree with many unknowns. Before him an equation had been regarded as only a tool to solve problems and was not the object of mathematical investigations. Although SEKI could not get any information of Western mathematics we can find many similarities with SEKI's mathematics and Western mathematics at that time.

SEKI and the TAKEBE brothers, Katahiro and Kata-akira, who were the best students of SEKI planned to compose the mathematical books, which contain all the results they obtained and also all known results at that time. The first version was completed at the end of the 18th century. But SEKI seemed not satisfactory of the books and he kept a distance from completing the final version. The final version was completed by TAKEBE Kata-akira after SEKI's death and named "Taisei Sankei" (大成算経) consisting of 20 volumes.

In my talk, I will explain about SEKI's mathematics and its relationship with the "Yang Hui Suanfa" and "Suanxue Qimeng'' (算学啓蒙).