

Preface: Modern studies of variable stars

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Abstract In this Mini-Volume, seven papers written on the basis of talks selected from those presented at the scientific conference “Modern studies of variable stars,” commemorating Prof. M. A. Svechnikov (1933–2011), are published. The conference covered a variety of variable-star topics; the papers in this Mini-Volume deal with close, mainly eclipsing, binaries, Herbig Be stars and stellar molecular masers, with an accent on stellar catalogs of different kinds. We briefly review the contents of these papers.

Key words: stars: variable — stars: binaries — ISM: general

1 INTRODUCTION

Since 1970, Kourouka Astronomical Observatory, located in the Ural mountains to the western, European side of the main range, on the picturesque Chusovaya river, approximately 70 km west of the big city of Yekaterinburg (which is already on the Asian side of the range), has been the traditional location of yearly “Space Physics” conferences, with distinguished scientists as lecturers, and post-graduate and undergraduate students as contributors. On the last day of the 47th conference of this series, 2018 February 2, an attached professional conference was held entitled “Modern studies of variable stars.” Contributions presented at the latter conference covered a wide range of topics related to stellar variability.

On 1933 January 28, eighty-five years before the conference, the famous Russian researcher on binary and variable stars, distinguished university professor and tutor of many well-known Russian astronomers Mariy Anatolyevich Svechnikov (1933–2011) was born. The conference commemorated this outstanding scientist. In the current issue, Dryomova et al. (2019) review M.A. Svechnikov’s biography, his scientific activities and main achievements in astrophysics. In particular, he suggested simple criteria permitting detailed classification of eclipsing variable stars on the basis of limited information. Since 1969, M.A. Svechnikov compiled and published (with co-authors) ten catalogs of close binary systems (the last of

them appeared after his death), which still represents an important source of information. The paper is illustrated with five of Svechnikov’s photographs in different situations of his life. One of us (N.N.S.) vividly remembers M.A. Svechnikov diving in Odessa in 1980, dressed exactly like in figure 5.

The contribution by Kovaleva et al. (2019) deals with variable stars in the Binary star DataBase (BSD). This database, initiated years ago at Besançon Astronomical Observatory (France), is now a project of the Moscow Institute of Astronomy. Variable stars enter this database as eclipsing systems (binaries by definition) or as components of binary systems. The paper is illustrated with several interesting screenshots, explaining the contents of the database using the Cepheid SU Cyg as an example.

Sobolev et al. (2019a) compiled a database of H₂O, OH and SiO molecular masers. It contains about 11 000 sources where such masers were searched for, successfully or unsuccessfully. The list contains 1803 long-period (Mira or semiregular) variables, with at least one maser line detected for 832 of them. Most of the long-period variables detected as molecular masers show infrared excesses. Sobolev et al. (2019b) used the 2.5-m telescope at the new Kislovodsk (Caucasus) high-altitude observatory of the Sternberg Astronomical Institute to perform near-infrared photometry of the variable star associated with the water and methanol maser source G025.65+1.05. This is a high-mass young stellar object. During a strong flare of

the water maser, the infrared brightness of the object decreased.

Staritsin (2019) discusses compatibility of his theoretical results concerning early-type B stars with observations. Earlier, he demonstrated that partial mixing of matter between the radiative envelope and convective core of such stars could result in a luminosity increase. In the present issue, he demonstrates that, under certain conditions, this theoretical result does not contradict observations.

Dryomova & Dryomov (2019) considered implications of the Rossiter–McLaughlin effect for studies of eclipsing binaries. The effect, discovered in the first half of the 20th century, consists of variations in absorption-line shapes during eclipses. The authors focus their main attention on eclipsing binaries with known anomalies in their apsidal motion rate (AI Hya, NY Cep, EW Ori, AS Cam and DI Her) and demonstrate how the paradox can be solved when selecting appropriate polar inclinations.

Bisyarina et al. (2019) study variations of emission lines correlating with orbital-period phase for the binary Herbig Be star HD 200775. Their analysis makes use of spectra collected at Kourovka Astronomical Observatory (the site of the conference) during 6 years of observations as well as data acquired in the USA (by one of the co-authors, A.S. Miroshnichenko) and archive data.

Variations, known from the authors' earlier work to correlate with the orbital phase for several spectral lines, are then also found for a long list of FeII and SiIII lines.

The conference demonstrated a good progress in theoretical and observational studies of variable stars, a traditional field of astrophysical research in Russian institutes.

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