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NEW VARIABLE STARS IN THE OPEN CLUSTER M103 (NGC581)

LEE, H.[1]; KIM, S.-L.[2]; KIM, H.-J.[1]; JEON, Y.-B.[2]; PARK, H.-S.[1];

[1] Dept.of Earth Science Education, Korea National University of Education, Choongbuk 363-791, Korea (email:leeho119@boao.re.kr)

[2] Korea Astronomy and Space Science Institute, Daejeon , 305-348, Korea

Observatory and telescope:
Mt. Lemmon Optical Astronomy Observatory (LOAO)[1] in USA, 1.0m telescope

Detector:	2K CCD camera

Filter(s):	Johnson B, V

Transformed to a standard system:	yes
Standard stars (field) used:	Landolt's (1992) SA 98

Method of data reduction:
Standard CCD-frame reduction using the IRAF/DAOPHOT[2] package.

Remarks:
As a part of our survey project to search for low-amplitude pulsating stars in open clusters, we carried out time-series CCD photometry for 9 nights between October 2003 and February 2005. The observations were performed at LOAO. Instrumental magnitudes were obtained using the Point Spread Function fitting routine photometry in IRAF/DAOPHOT package (Massey & Davis 1992). To obtain reference standard magnitude we observed a standard region and B, V frames. We applied the ensemble normalization technique (Gilliland & Brown 1988, Kim et al. 1999) to standardize the instrumental magnitudes of all stars in the time-series CCD frames. We examined light variations of 5,023 stars in the observation field. Fifteen of 21 variable stars we found are new variable stars: seven δ Scuti-type pulsating stars and eight eclipsing binaries. Six variable stars have already been known in M103 (Wyrzykowski et al. 2002). Then we labeled the new variables as V7 $\sim$ V21. A chart of these new variable stars is shown in Figure 1. Light curves are displayed in Figure 2. Photometric properties of the new variable stars are listed in Table 1.

[1]Korea Astronomy and Space science Institute (KASI) had installed the telescope and has been operating it by remote control from Korea via a network connection.

[2]IRAF is distributed by the National Optical Astronomy Observatories, which are operated by the Association of Universities for Research in Astronomy, Inc., under cooperative agreement with the National Science Foundation.

[3]This study is partially supported by the research fund of the Korea National University of Education.

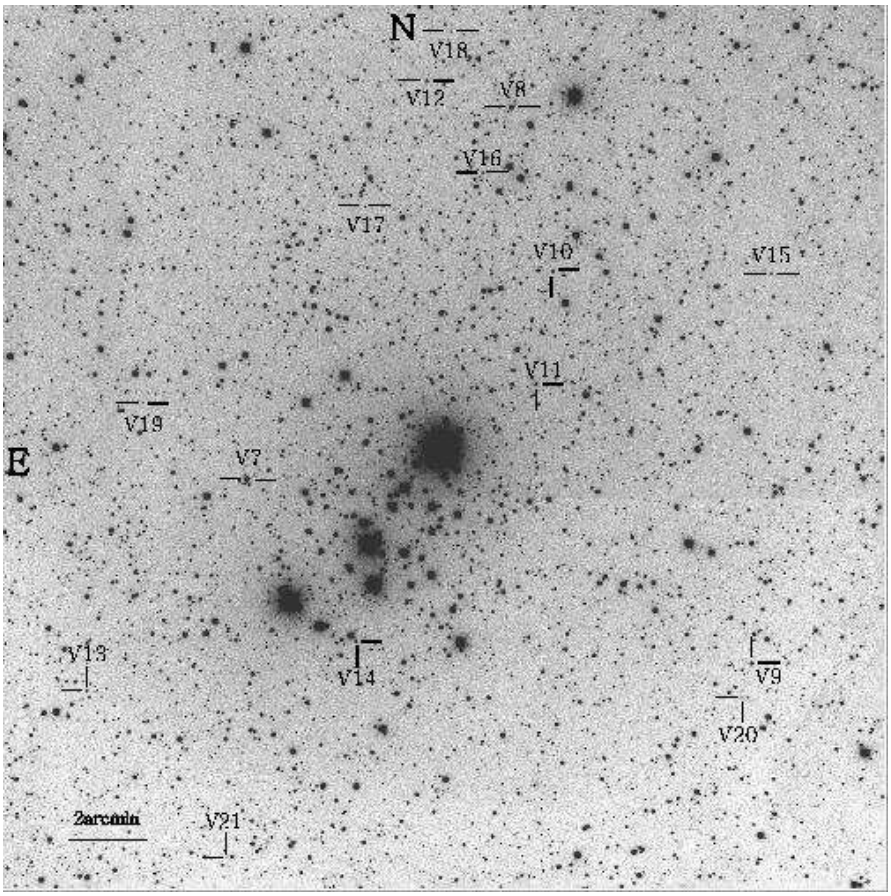

Figure 1. Observation field (22.′2×22.′2) of the open cluster M103. New variable stars are labeled as V7 ∼ V21. North is up and east to the left.

Table 1. List of new Variable stars

ID_{WEB}[†] or ID_{USNO}	ID_{OUR}	RA (J2000)	DEC (J2000)	m_V	T_0[‡]	Type	P_{days}
0112	V7	$01^h33^m53^s.975$	$+60°40'25''.50$	13.84	370.550	EA	2.0278
4910	V8	$01^h32^m59^s.571$	$+60°49'38''.25$	14.03	405.680	δ Sct	0.0725
4683	V9	$01^h32^m11^s.274$	$+60°35'45''.58$	15.16	402.643	δ Sct	0.1239
4901	V10	$01^h32^m51^s.155$	$+60°45'32''.81$	15.76	403.698	δ Sct	0.0282
1289	V11	$01^h32^m54^s.965$	$+60°42'44''.13$	15.84	403.625	δ Sct	0.0736
4922	V12	$01^h33^m16^s.874$	$+60°50'17''.75$	15.96	403.700	δ Sct	0.1463
5362	V13	$01^h34^m26^s.948$	$+60°35'09''.05$	16.69	405.660	EW	0.7080
1500-01583928	V14	$01^h33^m32^s.038$	$+60°36'24''.88$	16.74	367.935	δ Sct	0.3551
1500-01558083	V15	$01^h32^m06^s.490$	$+60°45'26''.75$	16.98	405.680	δ Sct	0.1100
8165	V16	$01^h33^m07^s.235$	$+60°47'50''.67$	16.99	365.760	EA	1.2410
7283	V17	$01^h33^m29^s.902$	$+60°47'10''.66$	17.25	366.690	EW	0.3525
1500-01577918	V18	$01^h33^m11^s.882$	$+60°51'31''.36$	18.29	405.650	EW	0.2915
5685	V19	$01^h34^m15^s.466$	$+60°42'18''.30$	18.62	365.760	EW	0.4464
1500-01560154	V20	$01^h32^m13^s.270$	$+60°34'56''.14$	18.81	405.680	EW	0.3555
1500-01592132	V21	$01^h33^m58^s.272$	$+60°31'02''.10$	19.17	405.620	EB	0.4514

[†] : Mermilliod J.C., 1992, in Open cluster data base (webda).
[‡] : epoch (2453000.0+) at maximum brightness for pulsating stars and minimum one for eclipsing binaries.

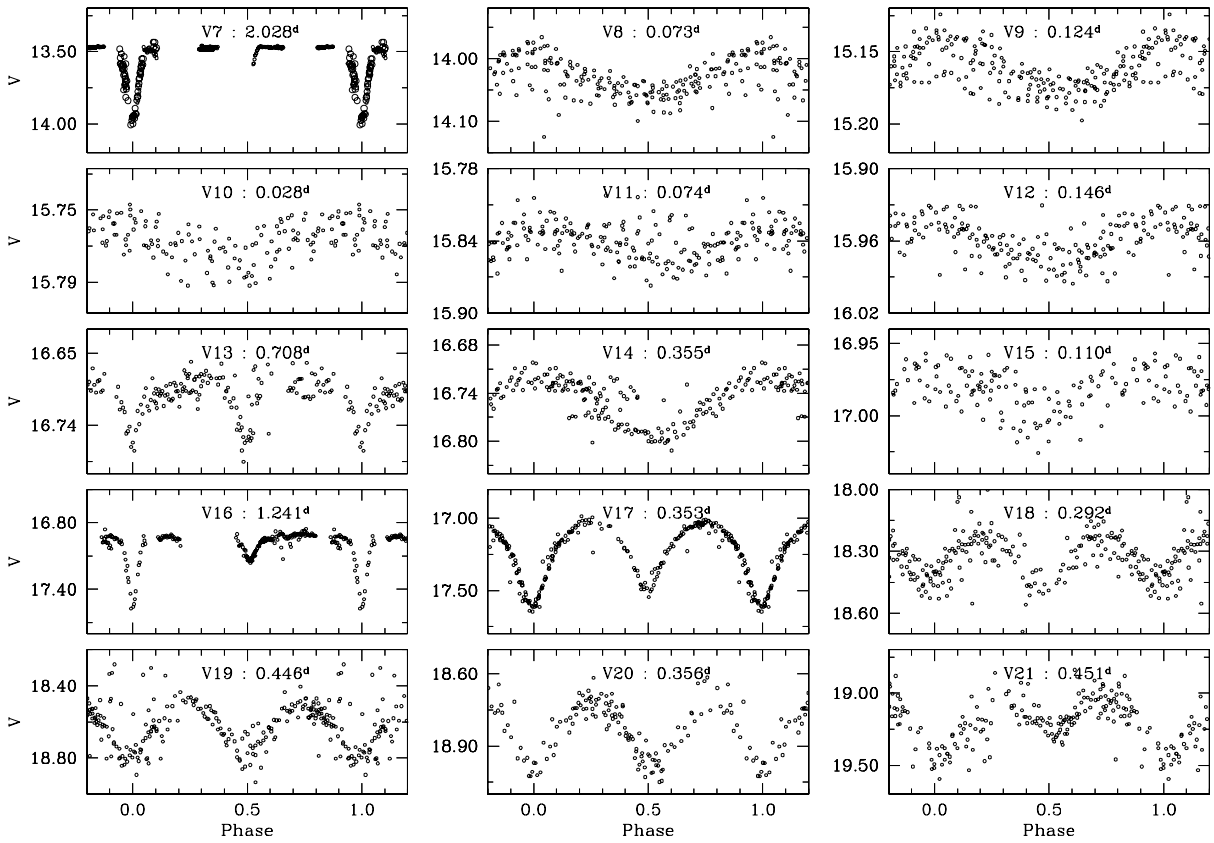

Figure 2. Light curves of 15 new variable stars.

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