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SEARCH OF SHORT-PERIOD PULSATING VARIABLES(I) [1]

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ABSTRACT

CCD differential photometry was carried out for seven stars in the "New Catalogue of Suspected Variable Stars" in order to discover new short-period pulsating variables such as low and high amplitude δ Scuti stars and RR Lyrae stars. It was found that NSV1132, NSV3031, and NSV5119 are RRs, Irregular, and low amplitude δ Scuti type variables respectively.

1. INTRODUCTION

Low amplitude δ Scuti stars are now objects of extreme interest for astroseismic research since many of them have been known to have rich pattern of frequencies in their light curves orginated from nonradial pulsation modes (see Kurtz 1988 for reviews). RR Lyrae stars, high amplitude δ Scuti stars like Dwarf Cepheids and SX Phe variables have been used to check pulsation and evolution theory.

Especially, SX Phe variables are blue stragglers in post-main-sequence stage evolution. The discovery of these stars in the blue straggler domain of globular clusters in the last decade has greatly enhanced our knowledge of their evolutionary status (see Eggen & Iben 1989). Nemec (1989) has reported that 25% of globular cluster blue stragglers are variable and that most of these are SX Phe stars. It would therefore be interesting to search for this type of variable stars.

In these days, the effort of trying to discover new variable stars has been concentrated to open clusters and globular clusters, and many new variable stars have been discovered successfully. However prior to the understanding of the nature of cluster variables, physical characteristics of field variables need to be known. Therefore, in addition to successful search of variables in clusters, field variable stars also need to be searched in order to increase their number. In case of field SX Phe type variables, only several of them have been detected.

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In order to discover new variables with small telescope, we developed a long term survey project adopting CCD differential photometry. Naturally we decided to search all candidates of variables in the "New Catalogue of Suspected Variables (NCSV)" by Kukarkin *et al.* (1982). Because our main purpose is discovering δ Scuti stars and RR Lyrae type stars, we selected all 113 candidates whose spectral type is A or F, and declination is greater than $-20°$ in this catalogue. Among these, as a first step, we observed seven stars. We like to point out that, in our search program, we just want to know which one is real δ Scuti or RR Lyrae type stars among all 113 cadidates through investigation of their light curve. Hence we did not try to cover full cycle in the observation for all program stars in order to determine their accurate period and/or other atmospheric parameters. But, in our next program, we plan to investigate physical properties for our new variables through time-series multi-color photometry.

2. OBSERVATION AND CLASSIFICATION

Observations for seven suspected variables of NSV681, NSV1132, NSV3031, NSV3592, NSV3665, NSV4851, and NSV5119 in NCSV were carried out with the 61cm reflector of Sobaeksan Observatory equipped with a liquid nitrogen cooled CCD camera system based on a Photometric PM512 chip, using the *Automatized Differential Photometry System* (ADPS; Park 1993). This system was developed to simulate a conventional photoelectric photometry by CCD camera for observations of short-period variable stars. The ADPS controls the 61cm telescope and the CCD camera simultaneously, and produces real time light curves through the aperture photometry of the CCD frames during running period of observations.

Table 1 shows name of the observed suspected variable stars and their type of variability, coordinates, light minimum magnitudes, name of the comparison stars, and observed dates. Name of the program stars is NSV (New Suspected Variable) number in NCSV. Integration time for program stars and comparison stars were two to seven seconds depending upon their brightness. Typical observational error is about 0.02 mag.

Observed differential magnitudes are given in Table 2 to Table 8 for seven program stars and all their light curves are presented in Figure 1. The light curve of NSV1132 is similar to that of RRs

Table 1. Journal of observations.

NAME	TYPE	SP	α	δ	m_V	COMP	DATE
NSV681		A0	1 58 01.3	28 31 11.3	7.70	SAO75067	07/11/94
NSV1132		A7	3 24 15.8	1 21 22.2	8.51	SAO111145	17,18,21/12/94
NSV3031		A0	6 34 45.5	7 34 22.4	6.44	SAO114041	10/01/95
NSV3592	DSCT:	F2	7 26 56.7	20 15 24.8	5.90	SAO79451	16/02/95
NSV3665	DSCT:	F5	7 37 16.4	-4 06 35.7	5.13	SAO134875	15/02/95
NSV4851		F0	10 25 34.9	8 46 31.9	7.70	HR4088	30,31/03/94
NSV5119		A2	11 12 10.8	68 16 16.9	6.40	SAO15414	25,26,28/02/94

1. Epoch of coordinate is 2000.
2. TYPE, SP, α, δ, and m_v are from the "New Catalogue of Suspected Variable Stars".

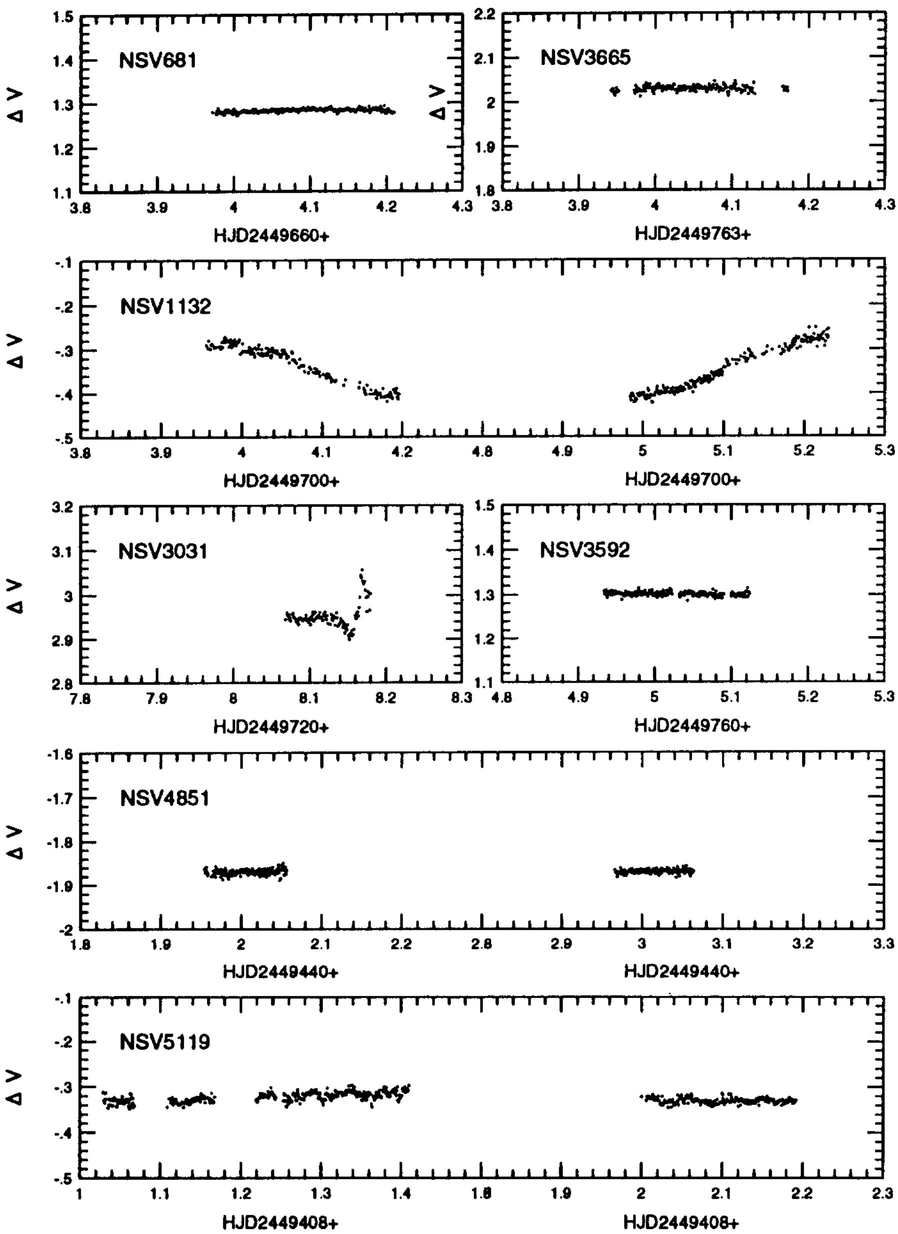

Figure 1. Light curve of all seven program stars.

Table 2. Differential photometry of NSV681 (HJD2449660+).

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
3.972	1.280	4.009	1.282	4.042	1.286	4.075	1.281	4.108	1.282	4.143	1.282	4.177	1.292
3.977	1.275	4.009	1.279	4.043	1.284	4.076	1.286	4.109	1.282	4.144	1.284	4.177	1.284
3.977	1.279	4.010	1.280	4.043	1.281	4.077	1.287	4.110	1.284	4.145	1.286	4.178	1.278
3.978	1.283	4.011	1.283	4.044	1.282	4.077	1.289	4.111	1.286	4.145	1.283	4.179	1.282
3.979	1.289	4.012	1.285	4.045	1.279	4.078	1.285	4.112	1.285	4.146	1.286	4.180	1.283
3.979	1.279	4.013	1.282	4.046	1.284	4.079	1.287	4.113	1.287	4.146	1.284	4.181	1.285
3.980	1.284	4.014	1.285	4.047	1.285	4.080	1.284	4.113	1.289	4.147	1.287	4.182	1.289
3.981	1.279	4.015	1.284	4.048	1.285	4.081	1.282	4.114	1.286	4.148	1.289	4.183	1.288
3.981	1.283	4.015	1.282	4.049	1.281	4.082	1.285	4.115	1.284	4.149	1.286	4.184	1.284
3.982	1.282	4.016	1.279	4.049	1.285	4.083	1.287	4.116	1.285	4.150	1.286	4.184	1.288
3.983	1.278	4.017	1.284	4.050	1.288	4.084	1.286	4.117	1.286	4.151	1.284	4.185	1.284
3.984	1.277	4.018	1.280	4.051	1.287	4.084	1.279	4.118	1.280	4.151	1.288	4.186	1.290
3.985	1.279	4.019	1.283	4.052	1.286	4.085	1.282	4.119	1.285	4.152	1.284	4.187	1.289
3.986	1.277	4.020	1.282	4.053	1.286	4.086	1.282	4.119	1.286	4.153	1.280	4.188	1.287
3.987	1.279	4.021	1.279	4.054	1.280	4.087	1.284	4.120	1.289	4.154	1.285	4.188	1.283
3.987	1.273	4.021	1.279	4.054	1.284	4.088	1.288	4.121	1.284	4.155	1.284	4.189	1.285
3.988	1.283	4.021	1.281	4.055	1.286	4.089	1.286	4.122	1.284	4.156	1.283	4.190	1.283
3.989	1.285	4.022	1.282	4.056	1.286	4.089	1.285	4.123	1.289	4.157	1.286	4.190	1.286
3.990	1.280	4.023	1.284	4.057	1.279	4.090	1.285	4.124	1.290	4.157	1.285	4.191	1.286
3.991	1.284	4.024	1.283	4.058	1.277	4.091	1.290	4.125	1.288	4.158	1.282	4.192	1.292
3.992	1.286	4.025	1.287	4.059	1.287	4.092	1.285	4.126	1.288	4.159	1.279	4.193	1.279
3.993	1.282	4.026	1.278	4.060	1.286	4.093	1.286	4.126	1.286	4.160	1.281	4.194	1.287
3.993	1.279	4.026	1.280	4.060	1.286	4.094	1.282	4.127	1.292	4.161	1.284	4.195	1.281
3.994	1.283	4.027	1.282	4.061	1.284	4.095	1.283	4.128	1.288	4.162	1.286	4.196	1.283
3.995	1.283	4.028	1.287	4.062	1.285	4.095	1.287	4.129	1.285	4.163	1.286	4.197	1.294
3.996	1.283	4.029	1.284	4.063	1.288	4.096	1.289	4.130	1.285	4.164	1.292	4.197	1.284
3.997	1.281	4.030	1.282	4.063	1.279	4.097	1.291	4.131	1.281	4.164	1.286	4.198	1.279
3.998	1.275	4.031	1.278	4.064	1.285	4.098	1.288	4.132	1.284	4.165	1.284	4.199	1.276
3.998	1.277	4.032	1.278	4.065	1.287	4.099	1.284	4.132	1.285	4.166	1.286	4.200	1.276
3.999	1.285	4.032	1.281	4.065	1.287	4.100	1.287	4.133	1.285	4.167	1.284	4.201	1.285
4.000	1.288	4.033	1.283	4.066	1.281	4.101	1.289	4.134	1.285	4.168	1.290	4.202	1.287
4.001	1.278	4.034	1.283	4.067	1.284	4.101	1.287	4.135	1.275	4.169	1.285	4.203	1.284
4.002	1.282	4.035	1.283	4.068	1.286	4.102	1.284	4.136	1.285	4.170	1.283	4.203	1.282
4.003	1.283	4.036	1.281	4.069	1.288	4.103	1.291	4.137	1.278	4.171	1.280	4.204	1.281
4.004	1.278	4.037	1.281	4.070	1.284	4.104	1.290	4.138	1.284	4.171	1.284	4.205	1.280
4.004	1.272	4.037	1.284	4.071	1.284	4.104	1.288	4.139	1.287	4.172	1.288	4.206	1.277
4.005	1.275	4.038	1.281	4.071	1.287	4.105	1.289	4.139	1.285	4.173	1.283	4.207	1.279
4.006	1.277	4.039	1.286	4.072	1.285	4.106	1.285	4.140	1.285	4.174	1.283	4.208	1.277
4.007	1.279	4.040	1.282	4.073	1.282	4.107	1.288	4.141	1.283	4.175	1.282	4.209	1.279
4.008	1.279	4.041	1.281	4.074	1.285	4.107	1.286	4.142	1.286	4.176	1.282	4.210	1.278

type or δ Scuti variable, and the period and amplitude are approximately 0.4day and 0.14 mag. Hence the period is too long as a δ Scuti star but amplitude is too small to be a RR Lyrae star. Although amplitude is low, temporarily we decide to classify NSV1132 as a RRs variable. Whether this star will be classified as a RRs or δ Scuti variables in the future through more observations, there is a strong possibility that this star is an extreme case of that type.

NSV3031 was observed for very short time but we can see that the light curve of this star was changed abruptly. This means that this star is an irregular type. On the other hand, for NSV5119, we can see that the light curve of this star changes periodically with the amplitude of about 0.02 mag. This star is therefore definitely a low amplitude δ Scuti variables. We tried to estimate the period of this star adopting the generalized least–squares method proposed by Vanicek (1971). This method has been shown to be very effective in recovering periodicities in complicated light curves (Antonello *et al.* 1986, Kim *et al.* 1993). Figure 2 shows the spectrum of the whole data set computed without *a priori* known frequency. It shows the presence of a periodic term at f=20.8 (c/d) which corresponds to P=0.0481 day.

Table 3. Differential photometry of NSV1132 (HJD2449700+).

HJD	Mag	HJD	Mag	HJD	Mag	HJD	Mag	HJD	Mag	HJD	Mag	HJD	Mag
3.956	-0.290	4.018	-0.298	4.084	-0.340	4.189	-0.391	5.031	-0.389	5.083	-0.363	5.181	-0.305
3.958	-0.297	4.020	-0.308	4.086	-0.345	4.190	-0.391	5.032	-0.399	5.084	-0.372	5.182	-0.295
3.959	-0.280	4.021	-0.298	4.089	-0.352	4.191	-0.397	5.033	-0.400	5.085	-0.354	5.184	-0.298
3.961	-0.299	4.021	-0.289	4.091	-0.343	4.192	-0.399	5.034	-0.400	5.086	-0.356	5.185	-0.288
3.962	-0.289	4.023	-0.312	4.092	-0.354	4.193	-0.389	5.035	-0.392	5.087	-0.370	5.186	-0.282
3.963	-0.287	4.024	-0.308	4.093	-0.345	4.194	-0.409	5.036	-0.396	5.088	-0.361	5.187	-0.279
3.964	-0.290	4.025	-0.299	4.094	-0.352	4.195	-0.413	5.037	-0.389	5.089	-0.362	5.187	-0.293
3.966	-0.296	4.026	-0.314	4.095	-0.353	4.196	-0.402	5.038	-0.400	5.090	-0.354	5.188	-0.280
3.968	-0.294	4.026	-0.314	4.096	-0.351	4.984	-0.409	5.039	-0.405	5.091	-0.352	5.189	-0.285
3.000	-0.292	4.027	-0.309	4.097	-0.361	4.985	-0.417	5.040	-0.397	5.092	-0.352	5.190	-0.273
3.972	-0.294	4.029	-0.312	4.101	-0.357	4.986	-0.402	5.041	-0.390	5.093	-0.360	5.191	-0.300
3.973	-0.292	4.030	-0.296	4.104	-0.359	4.987	-0.402	5.042	-0.396	5.094	-0.362	5.192	-0.278
3.974	-0.298	4.031	-0.309	4.105	-0.365	4.988	-0.407	5.043	-0.400	5.095	-0.349	5.193	-0.275
3.975	-0.283	4.032	-0.312	4.106	-0.355	4.989	-0.422	5.044	-0.390	5.096	-0.355	5.195	-0.296
3.976	-0.295	4.032	-0.307	4.108	-0.356	4.990	-0.420	5.045	-0.388	5.097	-0.348	5.196	-0.284
3.977	-0.283	4.033	-0.298	4.109	-0.361	4.991	-0.413	5.046	-0.396	5.098	-0.361	5.197	-0.280
3.978	-0.277	4.035	-0.303	4.110	-0.364	4.992	-0.416	5.047	-0.386	5.099	-0.354	5.198	-0.281
3.979	-0.283	4.036	-0.318	4.111	-0.374	4.993	-0.403	5.048	-0.394	5.100	-0.342	5.199	-0.285
3.979	-0.271	4.037	-0.313	4.112	-0.368	4.994	-0.406	5.049	-0.396	5.101	-0.343	5.200	-0.271
3.980	-0.274	4.038	-0.296	4.116	-0.373	4.995	-0.407	5.049	-0.397	5.102	-0.342	5.201	-0.270
3.981	-0.278	4.038	-0.300	4.117	-0.370	4.996	-0.401	5.050	-0.388	5.103	-0.325	5.202	-0.282
3.983	-0.282	4.039	-0.305	4.127	-0.381	4.997	-0.407	5.051	-0.393	5.104	-0.327	5.203	-0.275
3.983	-0.282	4.041	-0.302	4.129	-0.369	4.998	-0.404	5.052	-0.394	5.105	-0.332	5.204	-0.286
3.984	-0.294	4.042	-0.304	4.146	-0.387	4.999	-0.401	5.053	-0.379	5.106	-0.339	5.205	-0.276
3.985	-0.292	4.043	-0.308	4.147	-0.375	5.001	-0.400	5.054	-0.382	5.107	-0.337	5.206	-0.252
3.986	-0.277	4.044	-0.302	4.152	-0.388	5.002	-0.408	5.055	-0.380	5.111	-0.326	5.207	-0.279
3.987	-0.285	4.045	-0.310	4.153	-0.394	5.003	-0.414	5.056	-0.382	5.115	-0.326	5.208	-0.286
3.988	-0.294	4.046	-0.310	4.154	-0.401	5.004	-0.415	5.057	-0.391	5.116	-0.335	5.209	-0.274
3.989	-0.286	4.048	-0.317	4.155	-0.403	5.005	-0.406	5.058	-0.388	5.119	-0.327	5.210	-0.281
3.990	-0.281	4.049	-0.312	4.156	-0.381	5.006	-0.391	5.059	-0.374	5.121	-0.318	5.211	-0.278
3.990	-0.283	4.050	-0.311	4.160	-0.402	5.007	-0.396	5.060	-0.389	5.125	-0.320	5.212	-0.267
3.991	-0.277	4.050	-0.301	4.161	-0.392	5.008	-0.412	5.061	-0.373	5.126	-0.311	5.213	-0.280
3.992	-0.286	4.051	-0.302	4.164	-0.402	5.009	-0.407	5.062	-0.399	5.127	-0.323	5.214	-0.251
3.993	-0.290	4.053	-0.301	4.165	-0.401	5.010	-0.405	5.063	-0.382	5.128	-0.330	5.215	-0.278
3.994	-0.283	4.054	-0.308	4.167	-0.394	5.011	-0.421	5.063	-0.377	5.130	-0.324	5.216	-0.296
3.996	-0.282	4.056	-0.319	4.168	-0.412	5.012	-0.423	5.064	-0.381	5.131	-0.301	5.217	-0.270
3.997	-0.277	4.056	-0.312	4.169	-0.401	5.013	-0.407	5.065	-0.388	5.132	-0.305	5.218	-0.282
3.998	-0.310	4.057	-0.316	4.170	-0.404	5.014	-0.407	5.066	-0.376	5.133	-0.317	5.219	-0.276
4.000	-0.306	4.058	-0.316	4.171	-0.401	5.015	-0.400	5.067	-0.374	5.134	-0.314	5.220	-0.277
4.001	-0.286	4.059	-0.330	4.172	-0.400	5.016	-0.399	5.068	-0.372	5.135	-0.311	5.221	-0.270
4.002	-0.303	4.062	-0.305	4.173	-0.400	5.017	-0.393	5.069	-0.371	5.136	-0.317	5.222	-0.267
4.003	-0.303	4.063	-0.308	4.174	-0.409	5.018	-0.386	5.070	-0.366	5.139	-0.322	5.223	-0.279
4.006	-0.305	4.063	-0.323	4.175	-0.408	5.019	-0.398	5.071	-0.369	5.148	-0.313	5.224	-0.263
4.007	-0.302	4.065	-0.324	4.176	-0.389	5.020	-0.403	5.072	-0.379	5.150	-0.313	5.225	-0.294
4.008	-0.303	4.066	-0.324	4.178	-0.408	5.021	-0.404	5.073	-0.378	5.153	-0.308	5.226	-0.284
4.009	-0.294	4.066	-0.326	4.179	-0.407	5.021	-0.397	5.074	-0.376	5.154	-0.295	5.227	-0.270
4.010	-0.295	4.068	-0.331	4.180	-0.408	5.022	-0.396	5.075	-0.370	5.160	-0.302	5.228	-0.258
4.011	-0.310	4.071	-0.341	4.181	-0.419	5.023	-0.397	5.076	-0.362	5.169	-0.296	5.229	-0.276
4.011	-0.302	4.072	-0.322	4.182	-0.404	5.024	-0.400	5.077	-0.370	5.171	-0.313	5.229	-0.271
4.012	-0.298	4.074	-0.336	4.183	-0.403	5.025	-0.384	5.078	-0.374	5.173	-0.302	5.230	-0.254
4.013	-0.303	4.075	-0.335	4.184	-0.408	5.026	-0.390	5.079	-0.367	5.174	-0.308		
4.015	-0.309	4.077	-0.336	4.185	-0.397	5.027	-0.401	5.080	-0.362	5.175	-0.306		
4.016	-0.316	4.077	-0.338	4.186	-0.402	5.028	-0.394	5.081	-0.369	5.176	-0.290		
4.016	-0.296	4.078	-0.350	4.187	-0.409	5.029	-0.398	5.081	-0.373	5.177	-0.296		
4.017	-0.295	4.083	-0.353	4.188	-0.412	5.030	-0.390	5.082	-0.377	5.180	-0.302		

For other stars of NSV681, NSV3592, and NSV3665, systematic light curve variation can hardly be seen and therefore they can not be short-period variables. But there is a possibility that these stars can be long period variables.

Table 4. Differential photometry of NSV3031 (HJD2449720+).

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
8.068	2.945	8.086	2.947	8.102	2.952	8.118	2.956	8.135	2.960	8.150	2.933	8.166	2.995
8.070	2.960	8.087	2.950	8.103	2.945	8.119	2.953	8.136	2.949	8.151	2.908	8.167	3.044
8.071	2.955	8.089	2.947	8.104	2.956	8.120	2.962	8.137	2.930	8.152	2.899	8.168	3.039
8.072	2.956	8.090	2.944	8.104	2.962	8.121	2.954	8.139	2.935	8.153	2.913	8.169	3.056
8.073	2.950	8.091	2.942	8.105	2.941	8.122	2.945	8.140	2.939	8.154	2.910	8.170	3.031
8.074	2.944	8.092	2.946	8.106	2.944	8.123	2.954	8.141	2.947	8.155	2.920	8.171	3.025
8.075	2.942	8.093	2.946	8.107	2.961	8.124	2.936	8.142	2.943	8.156	2.908	8.172	3.031
8.077	2.958	8.094	2.947	8.108	2.947	8.127	2.934	8.143	2.927	8.157	2.911	8.173	3.011
8.078	2.959	8.095	2.955	8.109	2.951	8.128	2.957	8.144	2.940	8.158	2.923	8.174	2.994
8.079	2.951	8.096	2.944	8.111	2.954	8.129	2.947	8.145	2.933	8.160	2.954	8.175	2.962
8.081	2.948	8.097	2.945	8.112	2.950	8.130	2.943	8.146	2.935	8.161	2.947	8.176	2.996
8.082	2.941	8.098	2.939	8.113	2.961	8.131	2.953	8.146	2.914	8.162	2.959	8.177	3.007
8.083	2.939	8.099	2.945	8.114	2.950	8.132	2.951	8.147	2.924	8.163	2.962	8.179	2.966
8.084	2.943	8.100	2.948	8.115	2.950	8.133	2.932	8.148	2.927	8.164	2.953	8.180	3.003
8.085	2.934	8.101	2.933	8.117	2.943	8.134	2.948	8.149	2.921	8.165	2.972		

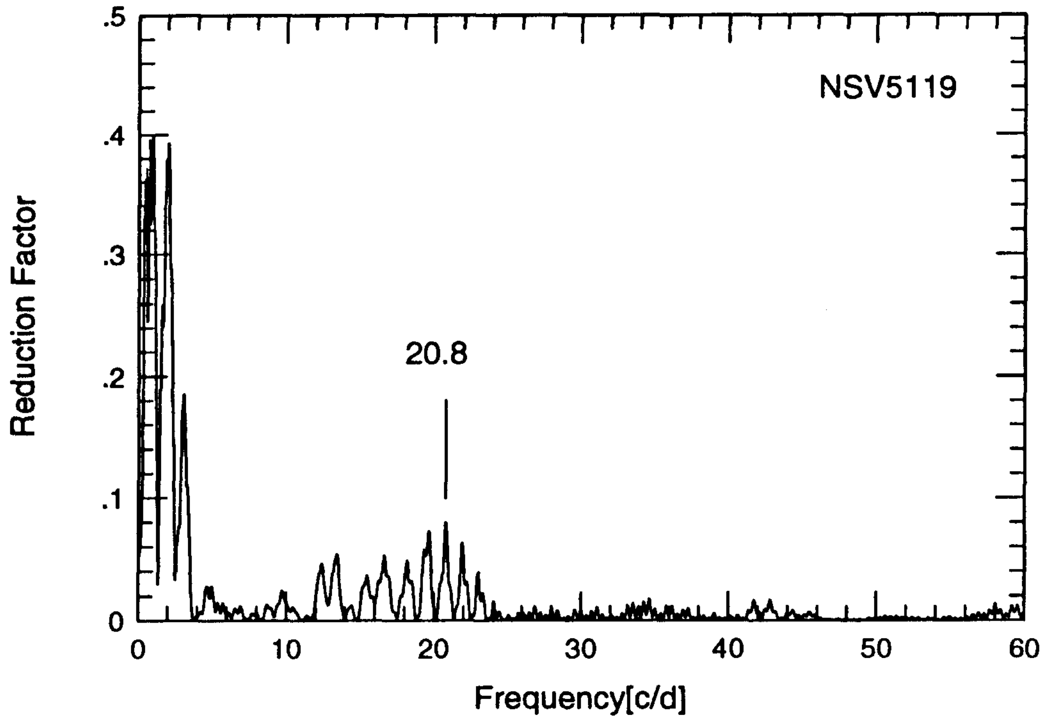

Figure 2. Power spectrum of NSV5119.

Table 5. Differential photometry of NSV3592 (HJD2449760+).

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
4.934	1.302	4.959	1.298	4.983	1.297	5.007	1.304	5.039	1.298	5.063	1.306	5.089	1.302
4.934	1.308	4.960	1.300	4.983	1.307	5.008	1.299	5.040	1.307	5.064	1.299	5.090	1.300
4.935	1.304	4.960	1.296	4.984	1.303	5.009	1.297	5.040	1.302	5.064	1.305	5.100	1.302
4.936	1.300	4.961	1.300	4.985	1.302	5.009	1.306	5.041	1.305	5.065	1.297	5.100	1.295
4.937	1.304	4.962	1.307	4.986	1.300	5.010	1.294	5.042	1.302	5.066	1.305	5.101	1.298
4.937	1.310	4.963	1.306	4.986	1.303	5.011	1.309	5.043	1.303	5.067	1.302	5.102	1.305
4.937	1.308	4.963	1.301	4.987	1.309	5.012	1.302	5.043	1.286	5.068	1.297	5.103	1.301
4.938	1.293	4.964	1.298	4.988	1.303	5.012	1.307	5.044	1.301	5.069	1.294	5.104	1.301
4.939	1.303	4.965	1.302	4.988	1.305	5.013	1.299	5.045	1.308	5.070	1.300	5.104	1.300
4.940	1.303	4.966	1.298	4.989	1.301	5.014	1.296	5.046	1.304	5.071	1.301	5.105	1.294
4.941	1.307	4.966	1.305	4.990	1.298	5.015	1.299	5.047	1.303	5.072	1.304	5.106	1.293
4.941	1.300	4.967	1.303	4.991	1.295	5.016	1.301	5.047	1.307	5.072	1.300	5.107	1.300
4.942	1.300	4.968	1.304	4.992	1.300	5.016	1.309	5.048	1.302	5.073	1.302	5.108	1.299
4.943	1.304	4.969	1.303	4.992	1.302	5.017	1.297	5.049	1.302	5.074	1.301	5.109	1.301
4.944	1.298	4.969	1.297	4.993	1.309	5.018	1.307	5.050	1.305	5.075	1.302	5.110	1.303
4.944	1.309	4.970	1.294	4.994	1.305	5.019	1.304	5.050	1.295	5.076	1.294	5.111	1.295
4.945	1.304	4.971	1.300	4.995	1.302	5.019	1.304	5.051	1.305	5.076	1.311	5.111	1.297
4.946	1.305	4.972	1.303	4.996	1.308	5.020	1.313	5.052	1.298	5.077	1.299	5.112	1.300
4.947	1.300	4.973	1.298	4.996	1.303	5.021	1.306	5.053	1.299	5.078	1.301	5.113	1.300
4.948	1.303	4.973	1.304	4.997	1.310	5.021	1.304	5.054	1.299	5.079	1.300	5.114	1.303
4.948	1.308	4.974	1.303	4.998	1.296	5.022	1.310	5.055	1.299	5.079	1.290	5.115	1.299
4.949	1.305	4.975	1.306	4.999	1.300	5.022	1.302	5.055	1.295	5.080	1.307	5.116	1.293
4.950	1.307	4.976	1.305	4.999	1.298	5.023	1.300	5.056	1.302	5.081	1.294	5.117	1.300
4.951	1.302	4.976	1.295	5.000	1.303	5.032	1.300	5.057	1.300	5.082	1.293	5.118	1.304
4.952	1.304	4.977	1.298	5.001	1.298	5.033	1.293	5.058	1.303	5.083	1.296	5.119	1.306
4.952	1.303	4.978	1.305	5.002	1.300	5.033	1.295	5.058	1.294	5.083	1.299	5.120	1.293
4.953	1.304	4.979	1.312	5.003	1.306	5.034	1.305	5.059	1.305	5.084	1.292	5.121	1.314
4.954	1.305	4.979	1.315	5.003	1.292	5.035	1.301	5.060	1.297	5.085	1.302	5.122	1.295
4.955	1.301	4.979	1.300	5.004	1.295	5.036	1.303	5.061	1.306	5.086	1.297	5.123	1.305
4.955	1.303	4.980	1.302	5.005	1.297	5.036	1.298	5.061	1.302	5.086	1.301	5.124	1.302
4.957	1.288	4.981	1.302	5.006	1.297	5.037	1.303	5.062	1.304	5.087	1.299		
4.958	1.303	4.982	1.306	5.006	1.304	5.038	1.303	5.063	1.301	5.088	1.291		

Table 6. Differential photometry of NSV3665 (HJD2449763+).

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
3.942	2.025	4.006	2.034	4.027	2.027	4.050	2.024	4.071	2.033	4.094	2.020	4.116	2.033
3.944	2.021	4.006	2.031	4.028	2.018	4.050	2.037	4.072	2.027	4.095	2.013	4.117	2.023
3.944	2.029	4.007	2.034	4.029	2.025	4.051	2.031	4.073	2.026	4.096	2.020	4.118	2.031
3.949	2.031	4.008	2.030	4.030	2.033	4.052	2.030	4.074	2.031	4.097	2.030	4.119	2.035
3.950	2.021	4.009	2.023	4.031	2.033	4.053	2.021	4.075	2.034	4.098	2.033	4.120	2.033
3.951	2.025	4.010	2.035	4.032	2.034	4.054	2.037	4.075	2.037	4.099	2.027	4.121	2.016
3.975	2.032	4.011	2.028	4.033	2.031	4.055	2.031	4.076	2.037	4.100	2.031	4.122	2.030
3.976	2.022	4.012	2.031	4.033	2.023	4.056	2.037	4.077	2.046	4.101	2.031	4.123	2.029
3.977	2.029	4.013	2.028	4.034	2.031	4.057	2.029	4.078	2.028	4.102	2.038	4.124	2.024
3.980	2.012	4.014	2.026	4.035	2.025	4.058	2.035	4.079	2.026	4.103	2.029	4.125	2.024
3.981	2.025	4.015	2.030	4.036	2.033	4.059	2.032	4.080	2.037	4.103	2.034	4.125	2.025
3.982	2.024	4.015	2.033	4.037	2.035	4.059	2.031	4.081	2.033	4.104	2.040	4.126	2.029
3.987	2.022	4.016	2.035	4.038	2.034	4.060	2.033	4.082	2.031	4.104	2.046	4.127	2.019
3.988	2.042	4.017	2.029	4.039	2.025	4.061	2.028	4.083	2.021	4.105	2.038	4.128	2.042
3.988	2.032	4.018	2.031	4.040	2.031	4.062	2.029	4.084	2.030	4.106	2.023	4.130	2.016
3.993	2.040	4.019	2.035	4.041	2.031	4.063	2.029	4.085	2.031	4.107	2.027	4.166	2.032
3.994	2.030	4.020	2.029	4.041	2.030	4.063	2.029	4.086	2.026	4.108	2.028	4.167	2.033
3.995	2.030	4.021	2.030	4.042	2.032	4.064	2.032	4.087	2.027	4.109	2.028	4.168	2.023
3.999	2.026	4.021	2.027	4.043	2.032	4.065	2.033	4.088	2.024	4.110	2.027	4.169	2.023
4.000	2.027	4.022	2.029	4.044	2.031	4.066	2.031	4.089	2.041	4.111	2.026	4.170	2.028
4.001	2.035	4.023	2.037	4.045	2.022	4.067	2.024	4.089	2.037	4.112	2.018	4.171	2.029
4.002	2.037	4.023	2.036	4.046	2.033	4.067	2.020	4.090	2.027	4.113	2.024	4.172	2.031
4.003	2.031	4.024	2.038	4.047	2.027	4.068	2.029	4.091	2.037	4.114	2.023	4.173	2.022
4.004	2.040	4.025	2.037	4.048	2.025	4.069	2.029	4.092	2.032	4.114	2.035		
4.005	2.031	4.026	2.026	4.049	2.029	4.070	2.038	4.093	2.030	4.115	2.033		

Table 7. Differential photometry of NSV4851 (HJD2449440+).

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
1.954	-1.863	1.987	-1.869	2.016	-1.867	2.044	-1.864	2.981	-1.875	3.010	-1.876	3.038	-1.871
1.955	-1.871	1.987	-1.869	2.016	-1.868	2.044	-1.872	2.982	-1.869	3.011	-1.866	3.039	-1.861
1.955	-1.864	1.988	-1.875	2.017	-1.876	2.045	-1.861	2.982	-1.870	3.011	-1.867	3.039	-1.869
1.956	-1.858	1.989	-1.863	2.017	-1.872	2.046	-1.872	2.983	-1.868	3.012	-1.871	3.040	-1.867
1.957	-1.867	1.989	-1.878	2.018	-1.874	2.046	-1.853	2.984	-1.865	3.012	-1.868	3.040	-1.865
1.957	-1.858	1.990	-1.866	2.019	-1.867	2.047	-1.864	2.984	-1.867	3.013	-1.868	3.041	-1.867
1.958	-1.877	1.990	-1.872	2.019	-1.869	2.047	-1.871	2.985	-1.867	3.014	-1.862	3.042	-1.883
1.958	-1.872	1.991	-1.870	2.020	-1.864	2.048	-1.888	2.985	-1.864	3.014	-1.870	3.042	-1.870
1.963	-1.880	1.991	-1.871	2.021	-1.872	2.049	-1.884	2.986	-1.868	3.015	-1.870	3.043	-1.866
1.964	-1.878	1.992	-1.870	2.021	-1.874	2.049	-1.855	2.986	-1.871	3.015	-1.868	3.044	-1.858
1.965	-1.867	1.993	-1.877	2.021	-1.866	2.050	-1.865	2.987	-1.862	3.016	-1.873	3.044	-1.874
1.966	-1.874	1.993	-1.874	2.021	-1.865	2.051	-1.865	2.988	-1.864	3.017	-1.869	3.045	-1.865
1.966	-1.867	1.994	-1.866	2.022	-1.861	2.051	-1.856	2.988	-1.873	3.017	-1.874	3.045	-1.875
1.967	-1.865	1.995	-1.872	2.022	-1.874	2.052	-1.849	2.989	-1.873	3.018	-1.866	3.046	-1.880
1.967	-1.866	1.995	-1.871	2.023	-1.880	2.052	-1.864	2.990	-1.866	3.018	-1.861	3.047	-1.868
1.968	-1.856	1.996	-1.868	2.024	-1.865	2.053	-1.866	2.990	-1.874	3.019	-1.875	3.047	-1.872
1.968	-1.881	1.996	-1.867	2.024	-1.869	2.053	-1.876	2.991	-1.873	3.020	-1.869	3.048	-1.869
1.969	-1.871	1.997	-1.867	2.025	-1.863	2.054	-1.876	2.991	-1.873	3.020	-1.867	3.048	-1.866
1.970	-1.862	1.998	-1.870	2.026	-1.873	2.055	-1.858	2.992	-1.869	3.021	-1.866	3.049	-1.869
1.970	-1.868	1.998	-1.870	2.026	-1.862	2.055	-1.866	2.993	-1.865	3.021	-1.878	3.050	-1.864
1.971	-1.867	1.999	-1.863	2.027	-1.866	2.056	-1.874	2.993	-1.871	3.021	-1.875	3.050	-1.867
1.971	-1.872	1.999	-1.879	2.027	-1.878	2.057	-1.866	2.994	-1.869	3.022	-1.870	3.051	-1.857
1.972	-1.870	2.000	-1.870	2.028	-1.873	2.966	-1.865	2.994	-1.865	3.022	-1.866	3.052	-1.873
1.973	-1.872	2.000	-1.867	2.029	-1.861	2.967	-1.871	2.995	-1.874	3.023	-1.871	3.052	-1.871
1.973	-1.867	2.001	-1.868	2.029	-1.873	2.968	-1.870	2.995	-1.868	3.024	-1.874	3.053	-1.874
1.974	-1.881	2.002	-1.862	2.030	-1.867	2.968	-1.869	2.996	-1.867	3.024	-1.861	3.053	-1.863
1.974	-1.863	2.002	-1.867	2.030	-1.867	2.969	-1.882	2.997	-1.864	3.025	-1.866	3.054	-1.863
1.975	-1.862	2.003	-1.871	2.031	-1.877	2.969	-1.876	2.997	-1.866	3.025	-1.863	3.055	-1.856
1.976	-1.875	2.004	-1.867	2.031	-1.882	2.970	-1.870	2.998	-1.873	3.026	-1.865	3.055	-1.864
1.976	-1.864	2.004	-1.871	2.032	-1.867	2.970	-1.871	2.999	-1.872	3.026	-1.869	3.056	-1.869
1.977	-1.866	2.005	-1.866	2.033	-1.861	2.971	-1.874	2.999	-1.863	3.027	-1.867	3.056	-1.864
1.977	-1.887	2.005	-1.862	2.034	-1.871	2.972	-1.873	3.000	-1.864	3.028	-1.868	3.057	-1.870
1.978	-1.870	2.006	-1.870	2.034	-1.866	2.972	-1.871	3.000	-1.864	3.028	-1.866	3.058	-1.863
1.979	-1.875	2.007	-1.863	2.035	-1.860	2.973	-1.860	3.001	-1.865	3.029	-1.868	3.058	-1.870
1.979	-1.877	2.007	-1.861	2.035	-1.877	2.974	-1.865	3.002	-1.870	3.030	-1.866	3.059	-1.878
1.979	-1.869	2.008	-1.862	2.036	-1.865	2.974	-1.875	3.002	-1.867	3.030	-1.868	3.060	-1.879
1.980	-1.860	2.008	-1.876	2.036	-1.869	2.975	-1.873	3.003	-1.872	3.031	-1.869	3.060	-1.873
1.980	-1.869	2.009	-1.871	2.037	-1.872	2.976	-1.872	3.003	-1.869	3.031	-1.860	3.061	-1.873
1.981	-1.866	2.009	-1.876	2.038	-1.867	2.976	-1.871	3.004	-1.865	3.032	-1.864	3.061	-1.864
1.981	-1.865	2.010	-1.868	2.038	-1.872	2.977	-1.878	3.004	-1.872	3.033	-1.862	3.062	-1.865
1.982	-1.875	2.011	-1.867	2.039	-1.858	2.977	-1.871	3.005	-1.863	3.033	-1.873	3.063	-1.869
1.982	-1.876	2.011	-1.865	2.039	-1.866	2.978	-1.871	3.006	-1.870	3.034	-1.874	3.063	-1.871
1.983	-1.880	2.012	-1.872	2.040	-1.869	2.978	-1.865	3.006	-1.871	3.034	-1.864	3.063	-1.868
1.984	-1.873	2.013	-1.870	2.041	-1.868	2.979	-1.871	3.007	-1.873	3.035	-1.868	3.063	-1.866
1.984	-1.886	2.013	-1.866	2.041	-1.873	2.979	-1.871	3.008	-1.869	3.036	-1.868	3.064	-1.868
1.985	-1.880	2.014	-1.861	2.042	-1.876	2.979	-1.871	3.008	-1.861	3.036	-1.868		
1.985	-1.869	2.014	-1.864	2.043	-1.871	2.980	-1.878	3.009	-1.866	3.037	-1.870		
1.986	-1.866	2.015	-1.875	2.043	-1.871	2.980	-1.878	3.009	-1.870	3.038	-1.874		

Table 8. Differential photometry of NSV5119 (HJD2449408+).

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
1.029	-0.312	1.038	-0.339	1.044	-0.326	1.051	-0.335	1.058	-0.333	1.064	-0.317	1.112	-0.326
1.030	-0.330	1.038	-0.329	1.045	-0.328	1.052	-0.328	1.059	-0.326	1.065	-0.340	1.113	-0.334
1.031	-0.335	1.039	-0.326	1.046	-0.343	1.053	-0.321	1.060	-0.328	1.066	-0.325	1.114	-0.328
1.032	-0.327	1.040	-0.326	1.047	-0.335	1.054	-0.330	1.061	-0.333	1.066	-0.336	1.114	-0.334
1.032	-0.313	1.041	-0.341	1.048	-0.335	1.055	-0.333	1.061	-0.342	1.067	-0.344	1.115	-0.323
1.035	-0.346	1.042	-0.330	1.049	-0.328	1.055	-0.337	1.062	-0.348	1.068	-0.341	1.116	-0.339
1.036	-0.340	1.043	-0.329	1.049	-0.330	1.056	-0.334	1.063	-0.326	1.109	-0.344	1.117	-0.331
1.037	-0.327	1.043	-0.323	1.050	-0.329	1.057	-0.328	1.063	-0.315	1.111	-0.326	1.118	-0.332

Table 8. (continued)

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
1.119	-0.326	1.222	-0.325	1.280	-0.319	1.332	-0.317	1.384	-0.318	2.030	-0.334	2.083	-0.331
1.120	-0.327	1.223	-0.324	1.281	-0.320	1.333	-0.311	1.385	-0.316	2.031	-0.334	2.084	-0.336
1.120	-0.335	1.224	-0.323	1.282	-0.314	1.334	-0.309	1.386	-0.322	2.033	-0.345	2.085	-0.330
1.121	-0.334	1.224	-0.315	1.283	-0.314	1.335	-0.298	1.387	-0.321	2.033	-0.334	2.086	-0.341
1.122	-0.339	1.225	-0.320	1.284	-0.313	1.335	-0.307	1.388	-0.311	2.034	-0.330	2.087	-0.342
1.123	-0.338	1.226	-0.323	1.285	-0.314	1.336	-0.307	1.389	-0.309	2.035	-0.328	2.088	-0.333
1.124	-0.340	1.227	-0.315	1.286	-0.313	1.337	-0.311	1.390	-0.307	2.036	-0.333	2.088	-0.338
1.125	-0.337	1.228	-0.321	1.286	-0.316	1.338	-0.309	1.391	-0.311	2.037	-0.344	2.089	-0.342
1.126	-0.337	1.229	-0.323	1.287	-0.318	1.339	-0.296	1.392	-0.314	2.038	-0.330	2.090	-0.333
1.126	-0.336	1.229	-0.318	1.288	-0.307	1.340	-0.313	1.392	-0.304	2.039	-0.328	2.091	-0.331
1.127	-0.333	1.229	-0.321	1.289	-0.309	1.341	-0.305	1.393	-0.315	2.039	-0.329	2.092	-0.339
1.128	-0.335	1.230	-0.316	1.290	-0.313	1.342	-0.300	1.394	-0.319	2.040	-0.335	2.093	-0.338
1.129	-0.345	1.231	-0.319	1.291	-0.313	1.342	-0.312	1.395	-0.308	2.041	-0.340	2.094	-0.338
1.130	-0.335	1.232	-0.322	1.292	-0.308	1.343	-0.317	1.396	-0.300	2.042	-0.337	2.094	-0.327
1.131	-0.336	1.233	-0.322	1.292	-0.309	1.344	-0.310	1.396	-0.330	2.044	-0.333	2.095	-0.338
1.132	-0.334	1.234	-0.310	1.293	-0.310	1.345	-0.322	1.397	-0.333	2.045	-0.318	2.096	-0.337
1.132	-0.331	1.235	-0.324	1.294	-0.306	1.346	-0.314	1.398	-0.318	2.045	-0.331	2.097	-0.334
1.133	-0.327	1.235	-0.319	1.295	-0.315	1.347	-0.320	1.399	-0.325	2.046	-0.339	2.098	-0.333
1.134	-0.337	1.236	-0.320	1.296	-0.315	1.348	-0.311	1.400	-0.321	2.047	-0.327	2.099	-0.334
1.135	-0.331	1.237	-0.312	1.297	-0.325	1.349	-0.313	1.401	-0.320	2.048	-0.321	2.100	-0.314
1.136	-0.339	1.238	-0.302	1.298	-0.321	1.350	-0.315	1.401	-0.319	2.049	-0.322	2.101	-0.317
1.137	-0.330	1.239	-0.311	1.299	-0.313	1.350	-0.320	1.402	-0.304	2.050	-0.318	2.101	-0.325
1.138	-0.337	1.240	-0.314	1.299	-0.317	1.351	-0.330	1.403	-0.309	2.051	-0.326	2.102	-0.330
1.138	-0.333	1.241	-0.319	1.300	-0.326	1.352	-0.330	1.404	-0.302	2.052	-0.332	2.103	-0.338
1.139	-0.333	1.242	-0.319	1.301	-0.330	1.353	-0.319	1.405	-0.300	2.052	-0.328	2.104	-0.334
1.140	-0.325	1.242	-0.318	1.302	-0.332	1.354	-0.311	1.406	-0.312	2.053	-0.336	2.106	-0.326
1.141	-0.331	1.243	-0.327	1.303	-0.339	1.354	-0.325	1.407	-0.308	2.054	-0.327	2.106	-0.326
1.142	-0.332	1.244	-0.323	1.304	-0.327	1.355	-0.319	1.408	-0.305	2.055	-0.320	2.107	-0.331
1.143	-0.324	1.253	-0.331	1.305	-0.316	1.356	-0.321	1.409	-0.309	2.056	-0.324	2.108	-0.316
1.144	-0.332	1.254	-0.315	1.306	-0.317	1.357	-0.329	1.410	-0.297	2.057	-0.318	2.110	-0.334
1.144	-0.327	1.255	-0.318	1.306	-0.329	1.357	-0.327	2.000	-0.321	2.058	-0.325	2.111	-0.316
1.145	-0.323	1.256	-0.331	1.307	-0.314	1.358	-0.313	2.006	-0.330	2.058	-0.336	2.112	-0.323
1.146	-0.328	1.257	-0.343	1.308	-0.303	1.359	-0.320	2.007	-0.321	2.059	-0.320	2.112	-0.328
1.146	-0.322	1.258	-0.332	1.309	-0.316	1.360	-0.312	2.008	-0.323	2.060	-0.324	2.113	-0.332
1.147	-0.324	1.259	-0.320	1.310	-0.322	1.361	-0.313	2.009	-0.320	2.062	-0.315	2.114	-0.331
1.148	-0.326	1.260	-0.325	1.311	-0.320	1.362	-0.316	2.010	-0.321	2.063	-0.331	2.115	-0.330
1.149	-0.327	1.260	-0.337	1.312	-0.327	1.363	-0.337	2.010	-0.321	2.063	-0.327	2.116	-0.333
1.150	-0.333	1.261	-0.323	1.313	-0.330	1.364	-0.344	2.011	-0.325	2.063	-0.319	2.117	-0.323
1.150	-0.321	1.262	-0.332	1.313	-0.329	1.365	-0.320	2.012	-0.326	2.064	-0.328	2.118	-0.323
1.151	-0.315	1.263	-0.330	1.313	-0.330	1.366	-0.322	2.013	-0.325	2.065	-0.333	2.119	-0.328
1.152	-0.317	1.264	-0.333	1.314	-0.316	1.366	-0.322	2.014	-0.317	2.066	-0.329	2.119	-0.327
1.153	-0.322	1.265	-0.317	1.315	-0.324	1.367	-0.329	2.015	-0.321	2.067	-0.327	2.120	-0.342
1.154	-0.326	1.266	-0.316	1.316	-0.324	1.368	-0.320	2.016	-0.322	2.068	-0.325	2.121	-0.332
1.155	-0.320	1.266	-0.314	1.317	-0.319	1.369	-0.312	2.016	-0.330	2.069	-0.325	2.122	-0.328
1.156	-0.322	1.267	-0.315	1.318	-0.308	1.370	-0.323	2.017	-0.324	2.069	-0.331	2.123	-0.340
1.156	-0.335	1.268	-0.321	1.319	-0.311	1.371	-0.319	2.018	-0.328	2.070	-0.329	2.124	-0.325
1.157	-0.325	1.269	-0.330	1.320	-0.311	1.372	-0.314	2.019	-0.330	2.071	-0.329	2.125	-0.331
1.160	-0.324	1.270	-0.331	1.320	-0.321	1.373	-0.308	2.020	-0.327	2.072	-0.331	2.125	-0.327
1.161	-0.327	1.271	-0.311	1.321	-0.321	1.374	-0.322	2.021	-0.330	2.073	-0.339	2.126	-0.330
1.162	-0.335	1.271	-0.307	1.322	-0.314	1.374	-0.320	2.021	-0.329	2.074	-0.334	2.127	-0.333
1.162	-0.326	1.272	-0.318	1.323	-0.313	1.375	-0.321	2.021	-0.320	2.075	-0.331	2.128	-0.330
1.163	-0.333	1.272	-0.318	1.324	-0.312	1.376	-0.324	2.022	-0.330	2.075	-0.331	2.129	-0.336
1.164	-0.314	1.273	-0.324	1.325	-0.313	1.377	-0.308	2.023	-0.337	2.076	-0.332	2.130	-0.328
1.165	-0.330	1.274	-0.337	1.326	-0.312	1.378	-0.310	2.024	-0.339	2.077	-0.330	2.131	-0.329
1.166	-0.335	1.275	-0.326	1.327	-0.320	1.379	-0.300	2.025	-0.336	2.078	-0.333	2.132	-0.334
1.167	-0.334	1.276	-0.327	1.327	-0.314	1.380	-0.307	2.026	-0.321	2.079	-0.336	2.132	-0.337
1.168	-0.322	1.277	-0.315	1.328	-0.318	1.381	-0.313	2.027	-0.340	2.080	-0.329	2.133	-0.329
1.219	-0.330	1.278	-0.317	1.329	-0.315	1.382	-0.302	2.027	-0.336	2.081	-0.335	2.134	-0.332
1.220	-0.327	1.279	-0.327	1.330	-0.317	1.383	-0.320	2.028	-0.335	2.082	-0.336	2.135	-0.337
1.221	-0.333	1.279	-0.329	1.331	-0.308	1.383	-0.310	2.029	-0.329	2.082	-0.339	2.136	-0.330

Table 8. (continued)

HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV	HJD	ΔV
2.137	-0.334	2.150	-0.327	2.165	-0.338	2.180	-0.329	3.932	-0.320	3.948	-0.323	3.964	-0.331
2.138	-0.333	2.151	-0.324	2.166	-0.336	2.181	-0.335	3.934	-0.330	3.949	-0.316	3.965	-0.330
2.138	-0.335	2.152	-0.326	2.167	-0.334	2.182	-0.332	3.935	-0.320	3.950	-0.330	3.966	-0.331
2.139	-0.330	2.153	-0.324	2.168	-0.337	2.183	-0.324	3.936	-0.312	3.951	-0.314	3.966	-0.329
2.140	-0.330	2.154	-0.332	2.169	-0.335	2.184	-0.323	3.937	-0.334	3.952	-0.326	3.967	-0.336
2.141	-0.336	2.155	-0.330	2.170	-0.334	2.184	-0.328	3.938	-0.322	3.953	-0.335	3.968	-0.328
2.142	-0.332	2.156	-0.320	2.170	-0.330	2.185	-0.331	3.938	-0.320	3.954	-0.323	3.969	-0.327
2.143	-0.325	2.157	-0.324	2.171	-0.330	2.186	-0.327	3.939	-0.317	3.955	-0.316	3.970	-0.318
2.144	-0.326	2.157	-0.327	2.172	-0.330	2.187	-0.329	3.940	-0.326	3.956	-0.335	3.971	-0.326
2.145	-0.324	2.158	-0.334	2.173	-0.328	2.187	-0.327	3.941	-0.320	3.956	-0.333	3.972	-0.321
2.145	-0.331	2.159	-0.328	2.174	-0.340	2.188	-0.336	3.942	-0.311	3.957	-0.338	3.973	-0.307
2.146	-0.340	2.160	-0.326	2.175	-0.327	2.189	-0.331	3.942	-0.322	3.958	-0.331	3.974	-0.306
2.146	-0.326	2.161	-0.326	2.176	-0.331	2.190	-0.334	3.943	-0.323	3.959	-0.326	3.976	-0.310
2.147	-0.323	2.162	-0.327	2.177	-0.333	2.190	-0.332	3.944	-0.325	3.960	-0.331	3.977	-0.297
2.148	-0.324	2.163	-0.331	2.177	-0.337	2.191	-0.329	3.945	-0.326	3.961	-0.320		
2.149	-0.325	2.164	-0.332	2.178	-0.334	2.192	-0.329	3.946	-0.314	3.962	-0.314		
2.150	-0.322	2.164	-0.327	2.179	-0.333	3.931	-0.326	3.947	-0.321	3.963	-0.316		

3. SUMMARY

We observed seven suspected variables in the NCSV through differential CCD photometry in order to discover new low or high amplitude δ Scuti variable. It was found that NSV5119 is a low amplitude δ Scuti variable with P=0.0481 day. Following program for the systematic observation of other A or F type candidates in the NCSV is carrying on.

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