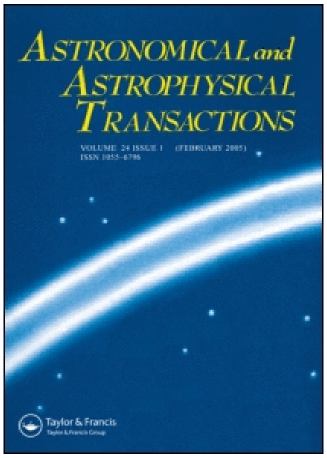

Astronomical & Astrophysical Transactions
The Journal of the Eurasian Astronomical Society
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713453505

Stellar proper motions in the procedure of detection of the radiants of stellar clusters

G. M. Popović [a]
[a] Astronomical Observatory, Belgrade, Volgina 7, Yugoslavia

Online Publication Date: 01 April 1995
To cite this Article: Popović, G. M. (1995) 'Stellar proper motions in the procedure of detection of the radiants of stellar clusters', Astronomical & Astrophysical Transactions, 7:2, 135 - 137
To link to this article: DOI: 10.1080/10556799508205405
URL: http://dx.doi.org/10.1080/10556799508205405

Astronomical and Astrophysical Transactions, 1995,
Vol. 7, pp. 135–137
Reprints available directly from the publisher.
Photocopying permitted by license only

STELLAR PROPER MOTIONS IN THE PROCEDURE OF DETECTION OF THE RADIANTS OF STELLAR CLUSTERS†

G. M. POPOVIĆ

Astronomical Observatory, 11050 Belgrade, Volgina 7, Yugoslavia

(Received December 25, 1993)

Following a suggestion of T. A. Agekyan, a method was developed for the detection of star cluster radiants using stellar proper motions. Presented herein are the fundamentals of the method.

KEY WORDS Proper motions, star clusters

1 INTRODUCTION

Agekyan and Orlov (1984) state: "The coronae of the desintegrated stellar clusters transform into clusters with a radiant". Considering that a stellar cluster once disintegrated does not appear any longer as an aggregation of stars – the star condensation getting lost against the ordinary sky background – the question arises of establishing an efficient procedure for detecting centers of moving clusters as well as bringing out the stars that have formed the coronae. Stellar proper motions offer a possibility of establishing such an effective method.

2 THE BASIC IDEA

Through two stars with known positions (equatorial coordinates) and proper motions, great circles are drawn along their proper motion vectors. Then the poles of the great circles are determined, changing equatorial coordinates into galactic ones. Through the poles of these great circles, in turn, another great circle is drawn, seeking its intersection (A, φ, longitude and inclination) with the galactic equator.

Proceeding in this way one obtains an intersection A, φ, for each one of the star pairs considered. If N stars are involved in the investigation, each one can be combined with another. Thus, each combination provides an intersection A, φ. With

†Proceedings of the Conference held in Kosalma

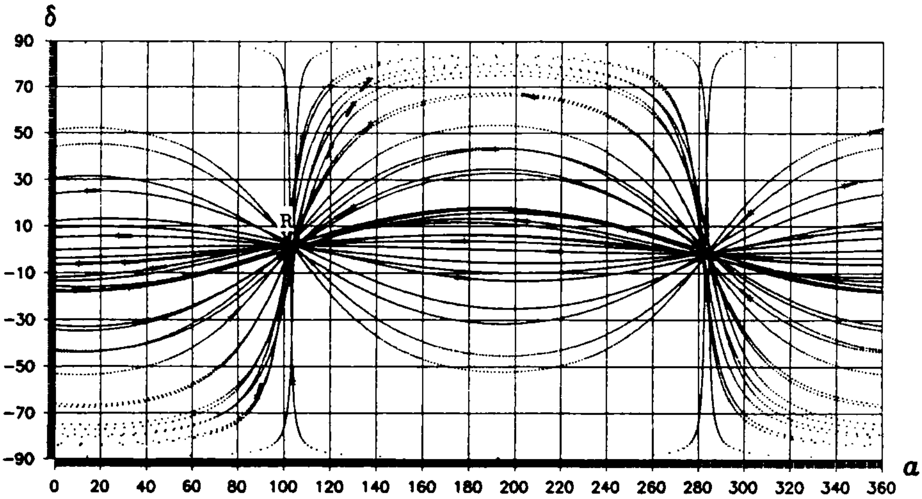

Figure 1 The position of the radiant R of the Manger radiant-cluster.

N elements (stars) without repetition, there will be $(N(N-1)):2$ combinations. Provided there were, among the stars in the sample, those belonging to the radiant clusters, concentration of the intersections will take place in certain areas of the rectangular coordinate system A, φ, due to the community of the proper motions. In other words there will occur certain swarming centers.

The transition from the parameters A, φ, of some of these grouping centers to the galactic coordinates is a simple one. The possibility is therewith given of separating stars whose proper motions feature the radiant. Namely, by taking apart all the stars that produce a concentration within the intervals $A \pm \Delta A$, $\varphi \pm \Delta\varphi$ we single out stars which are possible members of a cluster with the radiant $R(l,b) = f(A,\varphi)$.

Afterwards, great circles are drawn along the proper motions for all the stars in the sample which are possible members of a cluster. This is best done using equatorial coordinates, observing that proper motions are published in these coordinates. These great circles in a plane coordinate system take the form of "sinusoids", the two points of their intersections marking the radiant and the antiradiant. On the same graph one may plot the positions of the possible cluster stars as well as their proper motion vectors (see Figure 1). Depending on whether the "sinusoids" of given stars converge to, or diverge from the obtained common intersections one can without difficulty single out the "potential" from the "possible" member stars of a cluster.

3 CONCLUSIONS

Using the method proposed, one is able to bring out "all" the radiants within a star sample under investigation. The application is practicable only with the aid of the present-day computer technics.

Acknowledgement

I am grateful to Prof. Dr. T. A. Agekyan for his suggestion to develop this method as well as for helpful discussions and support during this work.

References

Agekyan, T. A. and Orlov, V. V. (1984) *Astron. Zh.* **61**, 60.
Popović, G. M. (1993) *Doctoral Dissertation*, Matematički facultet, Beograd.