Some insight, however, can be gained if we take these results not in isolation but rather conjointly with my previous studies of the giant stars. Because all of these studies use the same reduction method, variations caused by differences in the calculation of the velocity ellipsoid, such as use of the method of moments, will be minimized. Table 5 shows the velocity dispersions for all of the giant stars from O to M.

Two conclusions follow from an examination of Table 5. There is a clear break in all of the velocity dispersions between the F and the G giants. Dehnen & Binney (1998) confirmed this break, known as Parenago's discontinuity, for the main sequence stars, but it appears as if the giant stars also show the discontinuity. Use of the SVD to include stars for which only tangential velocities are available, the second conclusion, seems justified on more than just a statistical basis. Neither the F giants compared with earlier spectral types that use only total space motions nor the G giants with later spectral types exhibit glaring discrepancies, indicating that the tangential velocities are integrated well with the total space motions.

8. CONCLUSIONS

Semi-definite programming proves itself once again a useful tool for problems of Galactic kinematics by allowing one to combine a solution for the kinematical parameters such as the Oort constants with one for the coefficients of the velocity ellipsoid. The singular value decomposition allows one to incorporate stars for which only tangential velocities but no radial velocities are available into the calculation of the velocity ellipsoid. When applied to the G III stars the calculated solutions appear concordant with what others have found. A comparison with giant stars of other spectral types confirms that Parenago's discontinuity exists for the giant stars as well as main sequence stars.

REFERENCES

Airy, G. 1854, AJ, 4, 24
Aumer, M., & Binney, J. J. 2009, MNRAS, 397, 1286
Bobylov, V. V., & Bajkova, A. T. 2010, MNRAS, 408, 1788
Barbier-Brossat, M., & Figon, P. 2000, A&AS, 142, 217
Bochanski, J. J., Hawley, S. L., & West, A. 2011, AJ, 141, 98
Branham, R. L., Jr. 1990, Scientific Data Analysis (New York: Springer)
_____. 2003, Ap&SS, 288, 417
_____. 2004, A&A, 421, 977
_____. 2006, MNRAS, 370, 1393
_____. 2008, RevMexAA, 44, 29
_____. 2009a, MNRAS, 396, 1473
_____. 2009b, RevMexAA, 45, 215
_____. 2010, MNRAS, 409, 1269
Calafiore, G. 2002, IEEE Trans. Sys., Man Cyber., Part A, 32, 269
Dehnen, W., & Binney, J. J. 1998, MNRAS, 298, 387
Delhaye, J. 1965, in Galactic Structure, ed. A. Blaauw & M. Schmidt (Chicago: Chicago Univ. Press), 61
Eichhorn, H. 1990, in Errors, Bias and Uncertainties in Astronomy, ed. C. Jaschek & F. Murtagh (Cambridge: Cambridge Univ. Press), 149
ESA 1997, The Hipparcos and Tycho Catalogues, ESA SP-1200 (Noordwijik: ESA)
Fuchs, B., et al. 2009, AJ, 137, 4149
Høg, E., et al. 2000, The Tycho-2 Catalogue of the 2.5 Million Brightest Stars, CD-Rom version (Washington, DC: U. S. Naval Observatory)
Kerr, F. J., & Lynden-Bell, D. 1986, MNRAS, 221, 1023
McMillan, P. J., & Binney, J. J. 2010, MNRAS, 402, 934
Nagy, T. A. 1991, Documentation for the Machine-Readable Version of the Wilson General Catalogue of Stellar Radial Velocities, CD-Rom version (Lanham, MD: ST Systems Corp.)
Ogorodnikov, K. F. 1965, Dynamics of Stellar Systems (Oxford: Pergamon)
Perryman, M. 2008, Astronomical Applications of Astrometry (Cambridge: Cambridge Univ. Press)
Pourbaix, D. 1998, A&AS, 131, 377
Shen, M., & Zhang, H. 2010, Chin. J. Astron. Astrophys., 34, 89
Smart, W. M. 1968, Stellar Kinematics (New York: Wiley)
Smith, H., Jr., & Eichhorn, H. 1996, MNRAS, 281, 211
Stigler, S. M. 1977, Annals of Statistics, 5, 1055
Schönrich, R., Binney, J. J., & Dehnen, W. 2010, MNRAS, 403, 1829
Trumpler, R. J., & Weaver, H. F. 1962, Statistical Astronomy (New York: Dover)
van Leeuwen, F. 2007, Hipparcos, the New Reduction of the Raw Data (New York: Springer)
Vandenberghe, L., & Boyd, S. 1996, SIAM Review, 38, 49
Wonnacott, T. H., & Wonnacott, R. J. 1972, Introductory Statistics (2nd ed., New York: Wiley)
Yuan, F.-T., Zhu, Z., & Kong, D.-L. 2008, Chin. J. Astron. Astrophys., 8, 714

Richard L. Branham, Jr.: Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales, C.C. 330, 5500 Mendoza, Argentina (richardbranham_1943@yahoo.com).