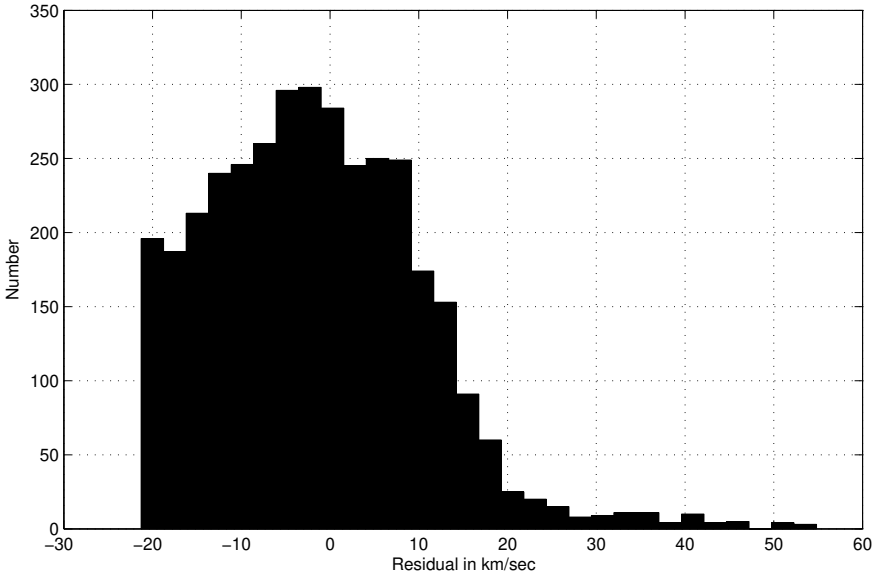

Fig. 10. Residuals in velocity for G giants.

TABLE 3

RECENT DETERMINATIONS OF THE SOLAR VELOCITY

Reference	Class	$-X$ (km s^{-1})	$-Y$ (km s^{-1})	$-Z$ (km s^{-1})	S_0 (km s^{-1})
Branham (2008)	M III	8.99 ± 0.42	20.40 ± 0.40	4.80 ± 0.39	24.20 ± 0.70[a]
Yuan et al. (2008)	O-B5	9.17 ± 0.40	8.66 ± 0.38	5.83 ± 0.34	13.90 ± 0.38[b]
Yuan et al. (2008)	K-M III	18.46 ± 0.32	17.70 ± 0.32	6.32 ± 0.32	20.61 ± 0.32[c]
Aumer & Binney (2009)	mixture IV, V	9.96 ± 0.33	5.25 ± 0.54	7.07 ± 0.34	13.29 ± 0.72
Branham (2009a)	B69 III	9.58 ± 0.39	11.94 ± 0.41	6.03 ± 0.33	16.40 ± 0.40[a]
Branham (2009a)	A III	9.85 ± 0.59	8.00 ± 0.58	5.80 ± 0.52	13.95 ± 0.58[a]
Branham (2009b)	K III	7.53 ± 0.26	19.11 ± 0.26	7.41 ± 0.22	21.83 ± 0.26[a]
Bobylev & Bajkova (2010)	Galactic masers	5.5 ± 2.2	11.0 ± 1.7	8.5 ± 1.2	15.0 ± 3.0
Branham (2010)	F III	10.84 ± 0.49	12.62 ± 0.49	8.14 ± 0.44	16.72 ± 0.41[a]
Schönrich et al. (2010)	F-G V	$11.1^{+0.69}_{-0.75}$	$12.24^{+0.47}_{-0.47}$	$7.25^{+0.37}_{-0.36}$	...
Shen & Zhang (2010)	Galactic Cepheids	12.58 ± 1.09	14.52 ± 1.06	8.98 ± 0.98	21.21 ± 1.81[d]

[a]Mean error calculated from equations (25) and (26) in Branham (2006).

[b]For heliocentric distance 0.2–3 kpc.

[c]For heliocentric distance 0.2–1 kpc.

[d]For heliocentric distance 0.2–3 kpc.

For the residuals from the velocity ellipsoid the situation becomes different, as Figure 10 shows. The residuals deviate even more from a normal distribution, coefficient of skewness 3.62, platykurtic, kurtosis 0.59, and light tailed, Q factor of 0.25. They are, however, even more random than the residuals from the kinematical solution, 1,784 runs out of an expected 1,813. There is thus a 33.7% probability that the residuals are random. This is the principal justification for use of the SVD to calculate the velocity ellipsoid.

Regarding recent determinations of the kinematical parameters Perryman (2008, p. 502) gives his Table 9.3 with pre-2007 results while Table 3 shows some post-2008 values. If we look at the 33 values for the solar velocity in both tables, without discriminating among spectrum-luminosity classes nor weighting by number of stars, there is a range from a minimum of 11.8 km s^{-1} to a maximum of 24.6 with mean 18.29 and standard deviation 3.74. The value in Table 1 falls well within this range. With respect to the Oort constants and