ASTRONOMY & ASTROPHYSICS
SUPPLEMENT SERIES

Astron. Astrophys. Suppl. Ser. **142**, 475–497 (2000)

Rovibrational excitation of HD molecules by He atoms

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Received December 21, 1999; accepted January 13, 2000

Abstract. Rate coefficients for rovibrational transitions induced in HD by collisions with He are presented. Full quantum mechanical treatment has been used with the interaction potential surface calculated by Muchnick & Russek (1994). The vibrational $v = 1 \rightarrow 0$ quenching rates of HD due to various perturbers are compared up to temperatures of 1500 K. The influence of vibrationally excited channels on the pure rotational excitation cross sections is shown to be negligible.

Key words: atomic data — atomic processes

1. Introduction

Pure rotational transitions of HD have been detected recently. In the dense photon dominated region of the Orion bar the R(0) line at 112 mμ has been detected with the long wavelength spectrometer (LWS) of ISO (Wright et al. 1999) and Bertoldi et al. (1999) report the detection of the R(5) line at 19.43 μm with the short wavelength spectrometer (SWS) of ISO in the Orion molecular outflow. On the other hand, infrared rovibrational transitions in HD have been predicted by Sternberg (1990) and Timmermann (1996) as possible occurrences in dense photon dominated regions (PDR). The interpretation of such observations require the knowledge of the different microscopic processes involved and in particular the rovibrational excitation rate coefficients due to the various perturbers, i.e. atomic and molecular hydrogen as well as helium. In a previous paper, Roueff & Zeippen (1999) have calculated the rotational excitation of HD due to collisions with helium. In the present work, these calculations are extended to the rovibrational excitation of HD by helium. Note that rovibrational excitation of HD by hydrogen atoms and molecules has already been calculated by Flower & Roueff (1999) in a complete close-coupling quantal approach. The same method is used in this study. Section 2 of the present paper summarizes the formalisms selected for the calculations. Results are given in Sect. 3 and a discussion plus a conclusion can be found in Sect. 4.

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2. Numerical methods

The computer code MOLSCAT developed by Hutson & Green (1995) has been used in this work. Close-coupling quantal collision equations are solved for a rotating harmonic oscillator perturbed by a structureless atom, in this case helium. Different numerical methods are implemented in the code to solve the coupled, second-order differential equations. Among the various possibilities, the hybrid modified LOG-DERIVATIVE/AIRY propagator (Alexander & Manolopoulos 1987) and the R-MATRIX propagator (Stechel et al. 1978) have been tried, with mutually consistent results. The potential surface of Muchnik & Russek (1994), relative to the H_2-He system, is expressed as a function of the distances between the three atoms in the system including a range of H_2 internuclear distances adequate to probe the vibrationally excited wave functions, as shown in Flower et al. (1998). The potential surfaces of the H_2-He and $HD-He$ systems are identical from the adiabatic point of view where nuclei are fixed. As in the previous related studies (Flower et al. 1998; Flower & Roueff 1999; Roueff & Zeippen 1999), the facility provided by the MOLSCAT program to expand the potential in terms of Legendre polynomials was used. Now, contrary to the H_2-He case, the Legendre expansion for the $HD-He$ interaction contains odd as well as even contributions of λ since the system is not symmetric anymore with respect to the exchange of nuclei within the molecule. In the present collision calculations, terms up to $\lambda = 15$ have been retained in the potential expansion and vibrational levels up to $v = 3$ have been included.

The integral cross-sections are obtained by summing the partial cross-sections σ_J until convergence is reached. A step of 1 is taken for collision energies smaller than 5000 cm^{-1}. Larger step values may be used for higher

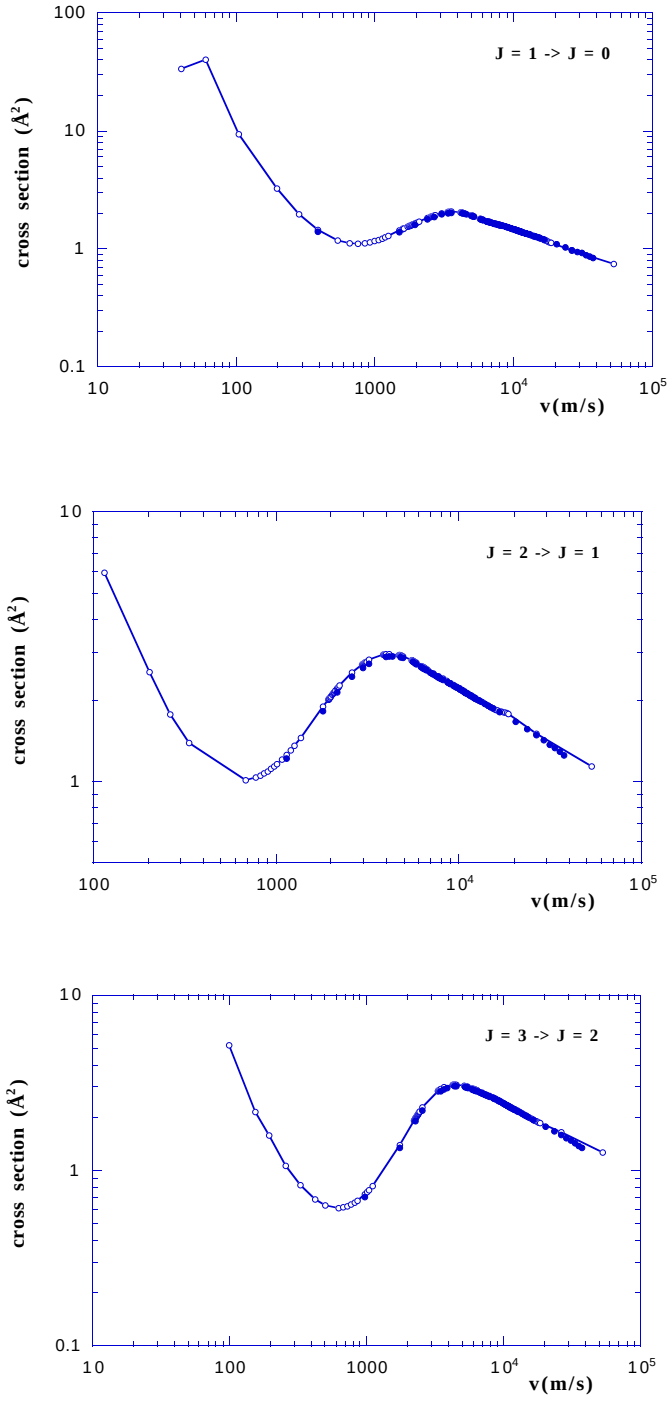

Fig. 1. Comparison between present (filled points) and rigid rotor results (Roueff & Zeippen 1999) (open points) for the de-excitation collisional cross-sections as a function of the relative center-of-mass velocity: **a)** de-excitation from the $J = 1$ level, **b)** de-excitation from the $J = 2$ level, **c)** de-excitation from the $J = 3$ level

Table 1. Labels and energies of HD rovibrational levels used in the present expansion basis

J	v	$E(\mathrm{cm}^{-1})$	$E(\mathrm{K})$
0	0	0.00	0.00
1	0	89.23	128.4
2	0	267.12	384.3
3	0	532.32	765.9
4	0	883.30	1270.7
5	0	1317.45	1895.4
6	0	1832.55	2635.8
7	0	2424.14	3487.5
8	0	3089.46	4445.3
0	1	3632.568	5226.7
1	1	3717.938	5349.6
9	0	3824.924	5503.5
2	1	3888.082	5594.4
3	1	4141.820	5959.5
4	1	4477.420	6442.3
10	0	4626.133	6656.3
5	1	4892.634	7039.8
6	1	5384.750	7747.8
11	0	5488.828	7897.6
7	1	5950.651	8562.1
12	0	6408.644	9221.1
8	1	6586.873	9477.5
0	2	7087.660	10198.1
1	2	7169.249	10315.5
9	1	7289.669	10488.7
2	2	7331.849	10549.4
13	0	7381.163	10620.4
3	2	7574.313	10898.3
4	2	7894.961	11359.7
10	1	8055.076	11590.0
5	2	8291.609	11930.4
14	0	8401.964	12089.2
6	2	8761.628	12606.7
11	1	8878.973	12775.5
7	2	9301.995	13384.2
15	0	9466.661	13621.1
12	1	9757.136	14039.0
8	2	9909.350	14258.1
0	3	10368.877	14919.3
1	3	10446.746	15031.3
16	0	10570.939	15210.0
9	2	10580.064	15223.1
2	3	10601.922	15254.6
13	1	10685.293	15374.5
3	3	10833.290	15587.5

energies since the partial cross-sections vary smoothly with J. This is fortunate because, as expected, the number of partial cross-sections becomes very large as collision energy increases. The expansion basis is made of the first 45 rovibrational levels in HD whose energies, displayed in Table 1, are taken from Dabrowski & Herzberg (1976) and Abgrall et al. (1982). Cross-sections for rovibrational transitions were calculated on a grid of barycentric collision energies extending from the threshold of the first rotational level at 89.23 cm^{-1} up to 100 000 cm^{-1}.

3. Results

The collision rates $q(T)$ are taken to be the Maxwellian average of the cross-sections:

$$q(T) = \left(\frac{8kT}{\pi\mu}\right)^{1/2}\left(\frac{1}{kT}\right)^{2}\int_0^\infty \sigma(E)E\mathrm{d}E\mathrm{e}^{-E/kT} \qquad (1)$$

where σ is the cross-section and μ the reduced mass of the system. The present excitation and de-excitation rates are given in Tables 2-5 for 4 temperatures: 300 K, 500 K, 1000 K and 1500 K. Collision rate coefficients for other temperatures are available on request from one of us (Evelyne.Roueff@obspm.fr).

To the best of our knowledge, there is no previous calculation or experiment to which the present results could be compared. It is all the more important to stress the excellent agreement between the new data and those obtained in our previous pure rotational excitation study based on the rigid rotor approximation (Roueff & Zeippen 1999). This shows that the coupling between rotation and vibration is negligible for the ground state. A typical example is displayed in Fig. 1 for the rotational de-excitation of the first three rotational levels as a function of the relative velocity between HD and He.

Table 6. Vibrational quenching rate of the $v = 1$ state in HD due to collisions with He, H and para H_2. Numbers in parentheses are powers of 10

T(K)	He	H	H_2
300	1.0(−16)	5.7(−15)	5.8(−17)
500	9.8(−16)	2.6(−14)	3.4(−16)
1000	2.1(−14)	3.4(−13)	8.1(−15)
1500	1.2(−13)	3.5(−12)	

4. Discussion and conclusion

Similar calculations have been performed on the HD−H and HD−H_2 systems by Flower & Roueff (1999). Table 6 gives a comparison between the quenching rate of the $v = 1$ state of HD due to collisions with He (present work), H and H_2 at different temperatures.

The magnitude of the quenching rate coefficients vary significantly with the perturber. At all temperatures considered, quenching by hydrogen atoms is more efficient by about one order of magnitude. However, collisions with helium predominate over those with molecular hydrogen.

Helium is sometimes taken as a prototype of the H_2 molecule in its ground state $J = 0$ in view of rotationally inelastic dynamics. The rate coefficients are then evaluated by scaling the values with the square root of the ratio of the reduced masses of the two systems:

$$\left(\frac{\mu_{\mathrm{HD-He}}}{\mu_{\mathrm{HD-H_2}}}\right)^{1/2} = 1.1934. \quad (2)$$

However, the results displayed in Table 6 show that this approximation is inadequate. In this work, we have extended the previous calculations of Flower & Roueff (1999) devoted to HD rovibrational excitation in H and H_2 collisions to the case of Helium. This should allow future infrared observations of HD in various environments to be interpreted without uncertainties related to basic molecular physics.

Acknowledgements. The present calculations were performed on the super-scalar computers at the IDRIS computer centre (Orsay, France) under contract No. 990939 (CP8).

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Table 2. Collision rate coefficients in cubic centimeters per second for a temperature $T = 300$ K. xDy denotes $x \times 10^y$

v_i, j_i		0, 0	0, 1	0, 2	0, 3	0, 4	0, 5	0, 6	0, 7
		0, 8	1, 0	1, 1	0, 9	1, 2	1, 3	1, 4	0,10
		1, 5	1, 6	0,11	1, 7	0,12	1, 8	2, 0	2, 1
		1, 9	2, 2	0,13	2, 3	2, 4	1,10	2, 5	0,14
		2, 6	1,11	2, 7	0,15	1,12	2, 8	3, 0	3, 1
		0,16	2, 9	3, 2	1,13	3, 3			
v_f, j_f	0, 0		3.17D−11	5.25D−12	1.41D−12	2.90D−13	5.67D−14	1.32D−14	2.05D−15
		3.82D−16	7.14D−19	6.49D−19	7.25D−17	1.27D−18	1.36D−18	1.58D−18	1.75D−17
		1.31D−18	6.73D−19	2.64D−18	3.67D−19	4.15D−19	1.56D−19	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 1	6.21D−11		4.03D−11	5.49D−12	1.45D−12	2.56D−13	5.79D−14	9.20D−15
		1.68D−15	2.15D−18	2.47D−18	3.18D−16	2.89D−18	4.50D−18	4.97D−18	7.73D−17
		4.33D−18	2.29D−18	1.17D−17	1.25D−18	1.85D−18	5.40D−19	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 2	7.30D−12	2.86D−11		3.52D−11	4.55D−12	8.83D−13	1.93D−13	2.90D−14
		5.33D−15	2.13D−18	3.23D−18	9.84D−16	5.55D−18	7.02D−18	9.60D−18	2.40D−16
		8.71D−18	4.71D−18	3.63D−17	2.71D−18	5.76D−18	1.18D−18	0.00D+00	0.00D+00
		4.72D−19	0.00D+00	9.46D−19	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 3	7.69D−13	1.53D−12	1.38D−11		2.85D−11	3.09D−12	6.42D−13	9.53D−14
		1.64D−14	3.09D−18	3.83D−18	2.96D−15	6.69D−18	1.16D−17	1.46D−17	7.17D−16
		1.57D−17	8.99D−18	1.08D−16	5.39D−18	1.71D−17	2.47D−18	0.00D+00	0.00D+00
		1.00D−18	0.00D+00	2.80D−18	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 4	3.77D−14	9.64D−14	4.27D−13	6.81D−12		2.07D−11	2.48D−12	3.29D−13
		5.48D−14	3.28D−18	7.30D−18	9.14D−15	8.17D−18	1.34D−17	2.37D−17	2.17D−15
		2.61D−17	1.66D−17	3.21D−16	1.09D−17	5.05D−17	5.12D−18	0.00D+00	0.00D+00
		2.16D−18	0.00D+00	8.20D−18	0.00D+00	0.00D+00	9.21D−19	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 5	1.12D−15	2.60D−15	1.26D−14	1.13D−13	3.16D−12		1.63D−11	1.45D−12
		2.00D−13	4.01D−18	5.94D−18	3.12D−14	1.50D−17	1.70D−17	2.86D−17	6.93D−15
		4.63D−17	2.99D−17	9.94D−16	2.19D−17	1.54D−16	1.10D−17	0.00D+00	0.00D+00
		4.78D−18	0.00D+00	2.45D−17	0.00D+00	0.00D+00	2.09D−18	0.00D+00	4.72D−18
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 6	2.62D−17	5.88D−17	2.76D−16	2.34D−15	3.78D−14	1.63D−12		1.10D−11
		9.66D−13	4.81D−18	4.94D−18	1.20D−13	1.14D−17	3.39D−17	4.02D−17	2.45D−14
		6.51D−17	5.71D−17	3.31D−15	4.48D−17	4.93D−16	2.42D−17	0.00D+00	6.79D−21
		1.11D−17	1.24D−20	7.64D−17	3.56D−20	2.87D−20	4.93D−18	0.00D+00	1.44D−17
		0.00D+00	1.92D−18	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 7	2.75D−19	6.31D−19	2.80D−18	2.34D−17	3.39D−16	9.83D−15	7.42D−13	
		7.94D−12	5.26D−18	4.60D−18	6.28D−13	9.22D−18	3.11D−17	9.55D−17	9.83D−14
		1.07D−16	8.98D−17	1.23D−14	9.67D−17	1.73D−15	5.47D−17	3.53D−21	9.29D−21
		2.65D−17	1.55D−20	2.54D−16	5.62D−20	3.55D−20	1.22D−17	4.51D−20	4.62D−17
		5.54D−20	4.82D−18	0.00D+00	8.67D−18	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00			
	0, 8	2.38D−21	5.36D−21	2.39D−20	1.88D−19	2.63D−18	6.28D−17	3.04D−15	3.70D−13
			3.15D−18	3.99D−18	5.71D−12	8.09D−18	3.65D−17	1.26D−16	5.28D−13
		3.21D−16	1.71D−16	5.34D−14	1.83D−16	6.83D−15	1.32D−16	5.91D−21	9.87D−21
		6.72D−17	2.06D−20	9.30D−16	6.88D−20	5.27D−20	3.18D−17	6.63D−20	1.59D−16
		9.51D−20	1.29D−17	9.54D−20	2.88D−17	5.12D−18	0.00D+00	0.00D+00	0.00D+00
		4.96D−18	0.00D+00	0.00D+00	0.00D+00	0.00D+00			

Table 2. continued

v_f, j_f									
	1, 0	1.94D−26	2.98D−26	4.16D−26	1.54D−25	6.84D−25	5.49D−24	6.57D−23	1.07D−21
		1.37D−20		3.24D−11	7.55D−20	5.62D−12	1.57D−12	3.16D−13	1.34D−19
		9.56D−14	1.53D−14	8.20D−20	3.60D−15	3.67D−20	6.23D−16	2.11D−18	1.99D−18
		1.10D−16	3.81D−18	1.50D−20	4.12D−18	4.52D−18	2.22D−17	3.11D−18	4.96D−21
		2.22D−18	4.61D−18	1.28D−18	1.13D−21	9.78D−19	7.13D−19	0.00D+00	0.00D+00
		0.00D+00	3.77D−19	0.00D+00	2.02D−19	3.69D−19			
	1, 1	3.51D−26	6.82D−26	1.26D−25	3.80D−25	3.03D−24	1.62D−23	1.34D−22	1.85D−21
		3.46D−20	6.46D−11		2.62D−19	4.18D−11	5.97D−12	1.54D−12	5.36D−19
		4.19D−13	6.49D−14	3.50D−19	1.59D−14	1.60D−19	2.68D−15	7.17D−18	7.78D−18
		4.75D−16	8.49D−18	6.62D−20	1.39D−17	1.39D−17	9.57D−17	9.97D−18	2.20D−20
		7.32D−18	1.99D−17	4.18D−18	4.97D−21	4.24D−18	2.39D−18	0.00D+00	3.83D−19
		0.00D+00	1.27D−18	0.00D+00	8.72D−19	1.16D−18			
	0, 9	1.49D−23	3.33D−23	1.45D−22	1.11D−21	1.44D−20	3.22D−19	1.24D−17	9.60D−16
		1.87D−13	5.70D−19	9.95D−19		3.95D−18	5.77D−17	2.68D−16	4.69D−12
		6.99D−16	6.57D−16	3.16D−13	4.22D−16	3.22D−14	2.92D−16	7.33D−21	8.55D−21
		1.84D−16	2.14D−20	3.88D−15	8.76D−20	7.50D−20	8.93D−17	1.36D−19	6.08D−16
		1.64D−19	3.64D−17	1.89D−19	1.03D−16	1.47D−17	3.54D−19	0.00D+00	0.00D+00
		1.66D−17	5.94D−19	0.00D+00	5.45D−18	0.00D+00			
	1, 2	5.06D−26	5.89D−26	1.59D−25	4.89D−25	2.50D−24	3.01D−23	2.29D−22	2.74D−21
		5.16D−20	8.25D−12	3.08D−11	7.68D−19		3.75D−11	4.64D−12	1.49D−18
		1.38D−12	2.09D−13	1.04D−18	4.88D−14	4.85D−19	8.25D−15	7.19D−18	1.06D−17
		1.44D−15	1.70D−17	2.06D−19	2.16D−17	2.59D−17	2.88D−16	1.88D−17	6.87D−20
		1.42D−17	6.00D−17	8.38D−18	1.53D−20	1.28D−17	4.87D−18	6.31D−19	7.65D−19
		0.00D+00	2.64D−18	4.42D−19	2.61D−18	2.16D−18			
	1, 3	2.25D−26	3.80D−26	8.35D−26	3.53D−25	1.70D−24	1.42D−23	2.82D−22	3.83D−21
		9.67D−20	9.57D−13	1.82D−12	4.65D−18	1.55D−11		2.95D−11	4.70D−18
		4.35D−12	6.72D−13	3.18D−18	1.57D−13	1.46D−18	2.45D−14	1.12D−17	1.32D−17
		4.24D−15	2.08D−17	6.23D−19	3.64D−17	3.79D−17	8.32D−16	3.14D−17	2.06D−19
		2.48D−17	1.72D−16	1.49D−17	4.46D−20	3.68D−17	9.23D−18	9.53D−19	1.38D−18
		0.00D+00	5.08D−18	7.80D−19	7.33D−18	3.49D−18			
	1, 4	6.70D−27	1.08D−26	2.93D−26	1.14D−25	7.74D−25	6.13D−24	8.60D−23	3.02D−21
		8.54D−20	4.95D−14	1.21D−13	5.54D−18	4.95D−13	7.59D−12		3.92D−17
		2.47D−11	2.52D−12	1.17D−17	5.24D−13	4.72D−18	7.88D−14	1.22D−17	2.54D−17
		1.28D−14	2.66D−17	1.96D−18	4.31D−17	5.83D−17	2.44D−15	4.67D−17	6.31D−19
		4.17D−17	4.97D−16	2.64D−17	1.31D−19	1.05D−16	1.72D−17	1.40D−18	2.27D−18
		2.13D−20	9.87D−18	1.33D−18	2.04D−17	5.52D−18			
	0,10	8.50D−26	1.92D−25	8.39D−25	6.39D−24	8.09D−23	1.70D−21	5.98D−20	3.56D−18
		4.11D−16	2.39D−20	4.82D−20	1.11D−13	1.81D−19	1.38D−18	4.49D−17	
		1.14D−15	2.52D−15	3.27D−12	2.07D−15	2.11D−13	7.56D−16	6.10D−21	5.86D−21
		4.95D−16	1.52D−20	1.96D−14	8.97D−20	1.26D−19	2.74D−16	2.71D−19	2.65D−15
		3.76D−19	1.13D−16	3.33D−19	4.12D−16	4.52D−17	8.12D−19	0.00D+00	9.01D−20
		6.07D−17	1.46D−18	5.07D−20	1.59D−17	2.80D−19			
	1, 5	9.26D−28	1.57D−27	4.44D−27	2.05D−26	1.42D−25	1.65D−24	2.32D−23	5.65D−22
		3.64D−20	2.49D−15	5.50D−15	2.42D−18	2.46D−14	1.86D−13	4.12D−12	1.66D−16
			1.72D−11	6.79D−17	2.18D−12	1.87D−17	2.73D−13	1.45D−17	2.14D−17
		4.26D−14	4.75D−17	6.88D−18	5.26D−17	6.60D−17	7.54D−15	7.45D−17	2.05D−18
		6.80D−17	1.49D−15	4.63D−17	4.00D−19	3.09D−16	3.32D−17	1.95D−18	3.50D−18
		6.16D−20	1.98D−17	2.07D−18	5.77D−17	8.89D−18			
	1, 6	5.32D−29	9.26D−29	2.68D−28	1.30D−27	1.01D−26	1.19D−25	2.27D−24	5.30D−23
		2.16D−21	4.44D−17	9.50D−17	2.53D−19	4.14D−16	3.21D−15	4.70D−14	4.09D−17
		1.92D−12		8.85D−16	1.48D−11	9.06D−17	1.23D−12	1.56D−17	1.72D−17
		1.58D−13	3.69D−17	2.79D−17	1.08D−16	9.23D−17	2.59D−14	9.41D−17	7.39D−18
		1.19D−16	4.81D−15	8.23D−17	1.30D−18	9.54D−16	6.61D−17	2.91D−18	5.66D−18
		1.96D−19	4.28D−17	3.09D−18	1.71D−16	1.48D−17			
	0,11	2.24D−28	5.07D−28	2.22D−27	1.68D−26	2.09D−25	4.25D−24	1.41D−22	7.79D−21
		7.26D−19	2.57D−22	5.50D−22	1.31D−16	2.22D−21	1.63D−20	2.35D−19	5.71D−14
		8.14D−18	9.50D−16		1.15D−14	2.48D−12	3.88D−15	3.23D−21	3.31D−21
		1.56D−15	9.21D−21	1.40D−13	6.48D−20	2.29D−19	8.65D−16	5.23D−19	1.41D−14
		9.09D−19	3.91D−16	5.88D−19	1.89D−15	1.54D−16	1.65D−18	3.12D−20	8.38D−20
		2.50D−16	3.76D−18	5.10D−20	5.10D−17	2.83D−19			

Table 2. continued

v_f, j_f									
	1, 7	2.22D−30	3.86D−30	1.18D−29	5.97D−29	5.04D−28	6.68D−27	1.36D−25	4.36D−24
		1.77D−22	8.02D−19	1.77D−18	1.24D−20	7.40D−18	5.73D−17	7.45D−16	2.57D−18
		1.86D−14	1.13D−12	8.19D−16		6.24D−16	9.37D−12	1.58D−17	1.33D−17
		7.87D−13	3.03D−17	1.34D−16	9.56D−17	1.92D−16	1.01D−13	1.50D−16	2.95D−17
		1.76D−16	1.74D−14	1.58D−16	4.64D−18	3.21D−15	1.37D−16	4.02D−18	8.12D−18
		7.24D−19	9.88D−17	4.77D−18	5.38D−16	2.56D−17			
	0,12	4.65D−31	1.06D−30	4.65D−30	3.51D−29	4.34D−28	8.68D−27	2.78D−25	1.44D−23
		1.23D−21	1.51D−24	3.30D−24	1.76D−19	1.36D−23	9.87D−23	1.25D−21	4.86D−17
		2.95D−20	1.28D−18	3.27D−14	1.16D−16		2.31D−14	7.98D−22	1.07D−21
		9.49D−15	3.69D−21	1.85D−12	3.98D−20	2.69D−19	3.23D−15	9.70D−19	1.06D−13
		2.08D−18	1.43D−15	1.45D−18	1.06D−14	5.92D−16	3.54D−18	2.14D−20	6.33D−20
		1.20D−15	1.04D−17	4.42D−20	1.89D−16	2.44D−19			
	1, 8	5.04D−32	8.95D−32	2.76D−31	1.47D−30	1.27D−29	1.80D−28	3.94D−27	1.32D−25
		6.84D−24	7.44D−21	1.61D−20	4.62D−22	6.71D−20	4.80D−19	6.01D−18	5.05D−20
		1.25D−16	5.06D−15	1.48D−17	5.02D−13	6.68D−15		9.07D−18	1.06D−17
		6.73D−12	2.52D−17	9.01D−16	1.10D−16	2.70D−16	5.45D−13	4.73D−16	1.40D−16
		3.44D−16	7.37D−14	2.65D−16	1.84D−17	1.23D−14	3.20D−16	4.98D−18	1.15D−17
		3.23D−18	2.59D−16	6.09D−18	1.89D−15	4.12D−17			
	2, 0	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	4.54D−32
		1.63D−30	1.34D−25	2.29D−25	6.17D−29	3.11D−25	1.17D−24	4.98D−24	2.17D−27
		3.53D−23	3.41D−22	6.56D−26	4.51D−21	1.23D−24	4.83D−20		3.18D−11
		2.16D−19	5.94D−12	1.15D−23	1.78D−12	3.60D−13	2.86D−19	8.43D−14	2.28D−23
		2.16D−14	2.02D−19	4.69D−15	1.10D−23	1.04D−19	1.27D−15	2.11D−17	2.66D−17
		2.34D−22	2.74D−16	1.31D−17	3.17D−19	8.77D−17			
	2, 1	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	1.20D−32	2.42D−31
		5.53D−30	2.57D−25	5.04D−25	1.46D−28	9.35D−25	2.80D−24	2.09D−23	4.22D−27
		1.06D−22	7.63D−22	1.37D−25	7.72D−21	3.33D−24	1.15D−19	6.45D−11	
		7.18D−19	4.34D−11	3.36D−23	6.52D−12	1.76D−12	1.11D−18	3.65D−13	8.47D−23
		9.06D−14	8.42D−19	2.01D−14	4.68D−23	4.59D−19	5.39D−15	6.45D−17	7.79D−17
		1.19D−21	1.15D−15	4.07D−17	1.44D−18	2.91D−16			
	1, 9	0.00D+00	0.00D+00	4.23D−33	2.28D−32	2.06D−31	3.00D−30	6.94D−29	2.46D−27
		1.34D−25	5.06D−23	1.09D−22	1.12D−23	4.50D−22	3.20D−21	3.75D−20	1.27D−21
		7.48D−19	2.48D−17	2.29D−19	1.62D−15	1.05D−16	2.59D−13	1.56D−18	2.55D−18
			1.09D−17	1.73D−14	1.54D−16	7.11D−16	5.07D−12	1.16D−15	8.61D−16
		1.49D−15	4.34D−13	5.43D−16	8.63D−17	5.57D−14	6.90D−16	5.19D−18	1.40D−17
		1.75D−17	7.99D−16	7.62D−18	7.64D−15	6.26D−17			
	2, 2	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	1.67D−32	3.09D−31
		8.82D−30	3.75D−25	4.20D−25	2.79D−28	1.14D−24	3.37D−24	1.67D−23	8.38D−27
		1.79D−22	1.25D−21	2.90D−25	1.34D−20	8.82D−24	2.08D−19	9.21D−12	3.32D−11
		2.35D−18		9.53D−23	3.96D−11	5.22D−12	3.14D−18	1.22D−12	2.27D−22
		2.85D−13	2.54D−18	5.89D−14	1.57D−22	1.42D−18	1.63D−14	1.18D−16	1.77D−16
		4.33D−21	3.35D−15	6.91D−17	4.67D−18	5.71D−16			
	0,13	0.00D+00	0.00D+00	7.76D−33	5.85D−32	7.17D−31	1.41D−29	4.38D−28	2.16D−26
		1.70D−24	6.29D−27	1.40D−26	2.16D−22	5.89D−26	4.30D−25	5.26D−24	4.61D−20
		1.11D−22	4.02D−21	1.88D−17	2.52D−19	1.89D−14	3.17D−17	7.63D−23	1.09D−22
		1.58D−14	4.06D−22		8.68D−21	8.41D−20	2.63D−14	8.84D−19	1.49D−12
		4.10D−18	6.16D−15	4.98D−18	8.47D−14	2.44D−15	9.77D−18	1.27D−20	3.69D−20
		7.33D−15	3.68D−17	3.42D−20	8.27D−16	2.24D−19			
	2, 3	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	2.10D−32	4.90D−31
		1.29D−29	1.78D−25	3.01D−25	5.00D−28	6.33D−25	2.58D−24	1.19D−23	2.16D−26
		8.70D−23	1.61D−21	8.94D−25	1.85D−20	4.16D−23	3.98D−19	1.21D−12	2.18D−12
		1.45D−17	1.73D−11	8.91D−22		3.25D−11	1.07D−17	3.95D−12	7.93D−22
		9.00D−13	7.83D−18	1.81D−13	4.90D−22	4.48D−18	4.74D−14	1.68D−16	1.96D−16
		1.52D−20	9.52D−15	1.47D−16	1.47D−17	1.16D−15			
	2, 4	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	4.67D−33	8.55D−32
		2.73D−30	5.39D−26	8.34D−26	1.18D−28	2.10D−25	7.42D−25	4.43D−24	8.37D−27
		3.01D−23	3.77D−22	8.71D−25	1.03D−20	7.77D−23	2.70D−19	6.74D−14	1.63D−13
		1.85D−17	6.31D−13	2.39D−21	8.97D−12		9.21D−17	2.57D−11	5.57D−21
		3.24D−12	3.19D−17	5.80D−13	1.85D−21	1.55D−17	1.51D−13	1.78D−16	3.83D−16
		5.24D−20	2.77D−14	1.75D−16	4.77D−17	2.45D−15			

Table 2. continued

v_f, j_f	1,10	0.00D+00	0.00D+00	0.00D+00	0.00D+00	2.47D−33	3.69D−32	8.67D−31	3.19D−29
		1.78D−27	2.87D−25	6.20D−25	1.53D−25	2.53D−24	1.76D−23	2.01D−22	1.98D−23
		3.72D−21	1.15D−19	3.57D−21	5.88D−18	1.01D−18	5.88D−16	5.79D−20	1.11D−19
		1.43D−13	4.11D−19	8.06D−16	3.20D−18	9.98D−17		3.12D−15	1.06D−14
		6.50D−15	4.44D−12	3.50D−15	5.34D−16	3.49D−13	2.11D−15	5.33D−18	1.53D−17
		1.17D−16	2.95D−15	9.53D−18	3.76D−14	1.07D−16			
	2, 5	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	1.98D−32
		6.26D−31	6.76D−27	1.09D−26	3.91D−29	2.78D−26	1.12D−25	6.48D−25	3.29D−27
		6.20D−24	7.02D−23	3.63D−25	1.46D−21	5.10D−23	8.61D−20	2.88D−15	6.15D−15
		5.50D−18	2.68D−14	4.57D−21	1.99D−13	4.68D−12	5.26D−16		3.70D−20
		2.00D−11	1.78D−16	2.23D−12	8.01D−21	6.32D−17	4.91D−13	2.83D−16	8.48D−16
		1.82D−19	8.56D−14	4.72D−16	1.58D−16	5.88D−15			
	0,14	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	2.18D−32	6.63D−31	3.15D−29
		2.34D−27	1.67D−29	3.72D−29	2.72D−25	1.58D−28	1.14D−27	1.36D−26	5.00D−23
		2.65D−25	8.56D−24	1.52D−20	4.47D−22	8.67D−18	3.96D−20	1.21D−24	2.22D−24
		6.34D−18	7.78D−24	1.20D−14	6.20D−23	1.58D−21	2.76D−15	5.74D−20	
		9.10D−19	6.90D−14	1.23D−17	1.28D−12	1.19D−14	3.89D−17	7.27D−21	2.02D−20
		6.70D−14	1.55D−16	2.63D−20	4.53D−15	3.09D−19			
	2, 6	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	3.02D−33
		1.11D−31	5.98D−28	9.90D−28	5.85D−30	2.60D−27	1.10D−26	7.18D−26	5.66D−28
		7.01D−25	1.10D−23	7.83D−26	2.13D−22	1.36D−23	7.76D−21	9.15D−17	1.89D−16
		8.76D−19	7.79D−16	2.63D−21	5.63D−15	7.34D−14	1.36D−16	2.49D−12	7.27D−20
			1.92D−15	1.47D−11	4.44D−20	2.95D−16	2.01D−12	7.63D−16	1.82D−15
		6.51D−19	2.80D−13	1.29D−15	5.65D−16	1.35D−14			
	1,11	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	7.11D−33	2.65D−31
		1.52D−29	1.25D−27	2.71D−27	1.31D−27	1.11D−26	7.67D−26	8.63D−25	1.72D−25
		1.55D−23	4.48D−22	3.39D−23	2.12D−20	9.39D−21	1.68D−18	8.61D−22	1.77D−21
		2.57D−16	6.99D−21	3.98D−18	4.93D−20	7.28D−19	9.35D−14	2.22D−17	5.55D−15
		1.93D−15		2.51D−14	4.61D−15	3.57D−12	1.49D−14	3.79D−18	1.07D−17
		8.54D−16	1.45D−14	9.31D−18	2.55D−13	1.41D−16			
	2, 7	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		9.66D−33	2.98D−29	4.89D−29	5.84D−31	1.33D−28	5.71D−28	3.92D−27	4.33D−29
		4.13D−26	6.58D−25	4.38D−27	1.65D−23	8.16D−25	5.17D−22	1.72D−18	3.62D−18
		2.76D−20	1.39D−17	2.76D−22	9.76D−17	1.13D−15	6.31D−18	2.39D−14	8.46D−20
		1.27D−12	2.15D−15		2.55D−19	2.20D−15	1.30D−11	1.31D−15	3.25D−15
		2.96D−18	1.25D−12	2.09D−15	2.43D−15	2.58D−14			
	0,15	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	3.83D−32
		2.73D−30	2.47D−32	5.44D−32	2.98D−28	2.27D−31	1.60D−30	1.83D−29	5.03D−26
		3.35D−28	9.78D−27	1.32D−23	4.55D−25	5.63D−21	3.38D−23	3.77D−27	7.93D−27
		4.11D−21	3.47D−26	4.40D−18	2.48D−25	3.40D−24	9.04D−19	8.05D−23	8.26D−15
		3.60D−21	3.71D−16	2.40D−19		1.54D−13	4.84D−17	2.67D−21	7.29D−21
		1.10D−12	3.36D−16	1.45D−20	3.33D−14	2.26D−19			
	1,12	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		9.73D−32	4.28D−30	9.32D−30	8.50D−30	3.82D−29	2.64D−28	2.93D−27	1.10D−27
		5.17D−26	1.43D−24	2.15D−25	6.31D−23	6.27D−23	4.49D−21	7.18D−24	1.56D−23
		5.31D−19	6.29D−23	2.54D−20	4.54D−22	5.70D−21	1.18D−16	1.27D−19	1.54D−17
		4.78D−18	5.76D−14	4.14D−16	3.08D−14		7.51D−14	1.55D−18	4.19D−18
		6.44D−15	1.15D−13	5.96D−18	2.81D−12	1.10D−16			
	2, 8	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	1.02D−30	1.72D−30	6.72D−32	4.76D−30	2.17D−29	1.57D−28	6.51D−30
		1.82D−27	3.25D−26	7.58D−28	8.84D−25	1.23D−25	3.84D−23	2.87D−20	5.99D−20
		2.16D−21	2.37D−19	3.33D−23	1.57D−18	1.81D−17	2.35D−19	3.24D−16	1.65D−20
		1.07D−14	7.86D−17	8.02D−13	3.18D−18	2.46D−14		8.82D−16	2.13D−15
		1.13D−17	8.89D−12	2.29D−15	1.02D−14	3.37D−14			
	3, 0	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	4.00D−33	1.46D−32	8.34D−32	0.00D+00
		6.96D−31	9.31D−30	9.27D−32	1.68D−28	4.83D−30	3.88D−27	3.10D−24	4.66D−24
		1.05D−25	1.11D−23	2.82D−28	3.63D−23	1.39D−22	3.85D−24	1.21D−21	2.01D−26
		2.63D−20	1.30D−22	5.23D−19	1.14D−24	3.29D−21	5.73D−18		3.37D−11
		4.25D−23	3.34D−17	6.07D−12	4.25D−20	2.47D−12			

Table 2. continued

v_f, j_f	3, 1	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	3.70D−33	0.00D+00	1.00D−32	4.35D−32	2.78D−31	9.67D−33
		2.58D−30	3.74D−29	5.15D−31	7.01D−28	2.95D−29	1.85D−26	8.04D−24	1.16D−23
		5.86D−25	3.46D−23	1.69D−27	8.74D−23	6.17D−22	2.28D−23	7.50D−21	1.15D−25
		1.30D−19	7.58D−22	2.68D−18	6.41D−24	1.84D−20	2.86D−17	6.95D−11	
		2.31D−22	1.64D−16	4.28D−11	2.19D−19	8.57D−12			
	0,16	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		2.51D−33	0.00D+00	0.00D+00	2.57D−31	0.00D+00	0.00D+00	1.58D−32	3.95D−29
		2.75D−31	7.85D−30	9.30D−27	3.79D−28	3.39D−24	3.16D−26	4.29D−28	1.08D−27
		4.44D−24	5.12D−27	2.03D−21	4.11D−26	5.13D−25	1.05D−21	9.78D−24	2.31D−18
		2.82D−22	3.66D−19	1.48D−20	5.87D−15	1.72D−16	9.17D−19	5.32D−22	1.40D−21
			1.87D−16	3.95D−21	3.49D−13	6.10D−20			
	2, 9	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	2.42D−32	4.08D−32	5.05D−33	1.15D−31	5.36D−31	4.05D−30	5.24D−31
		4.87D−29	9.43D−28	7.72D−29	2.85D−26	1.62D−26	1.39D−24	2.77D−22	5.71D−22
		1.12D−22	2.18D−21	5.63D−24	1.42D−20	1.49D−19	1.47D−20	2.53D−18	2.95D−21
		6.68D−17	3.43D−18	3.45D−15	9.88D−19	1.69D−15	3.98D−13	2.31D−16	5.49D−16
		1.03D−16		1.19D−15	1.24D−13	1.89D−14			
	3, 2	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	0.00D+00	0.00D+00	0.00D+00	4.57D−33	1.95D−32	1.29D−31	4.31D−33
		1.21D−30	1.61D−29	2.48D−31	3.26D−28	1.63D−29	7.76D−27	3.13D−24	4.80D−24
		2.53D−25	1.07D−23	1.24D−27	5.18D−23	2.23D−22	1.12D−23	3.31D−21	1.19D−25
		7.30D−20	5.22D−22	1.36D−18	1.01D−23	2.07D−20	2.43D−17	9.92D−12	3.39D−11
		5.16D−22	2.82D−16		4.36D−19	4.59D−11			
	1,13	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	1.11D−32	2.41D−32	3.97D−32	9.78D−32	6.64D−31	7.18D−30	4.90D−30
		1.22D−28	3.23D−27	8.97D−28	1.33D−25	2.52D−25	8.73D−24	2.75D−25	6.17D−25
		9.17D−22	2.61D−24	1.08D−22	1.88D−23	2.21D−22	1.61D−19	4.00D−21	7.40D−20
		1.16D−19	5.17D−17	5.75D−18	8.41D−17	3.54D−14	3.93D−16	2.52D−19	6.27D−19
		1.65D−13	1.06D−13	1.58D−18		2.48D−17			
	3, 3	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
		0.00D+00	2.59D−33	4.10D−33	0.00D+00	1.03D−32	4.03D−32	2.48D−31	1.10D−32
		2.39D−30	3.57D−29	6.36D−31	8.09D−28	4.16D−29	2.42D−26	9.68D−24	1.58D−23
		9.59D−25	4.07D−23	3.74D−27	1.89D−22	1.44D−21	5.85D−23	1.90D−20	6.43D−25
		3.51D−19	3.65D−21	7.78D−18	7.26D−23	1.76D−19	1.65D−16	1.86D−12	3.13D−12
		3.68D−21	2.06D−15	2.12D−11	3.16D−18				

Table 3. Collision rate coefficients in cubic centimeters per second for a temperature $T = 500$ K. xDy denotes $x \times 10^y$

v_i, j_i		0, 0	0, 1	0, 2	0, 3	0, 4	0, 5	0, 6	0, 7
		0, 8	1, 0	1, 1	0, 9	1, 2	1, 3	1, 4	0,10
		1, 5	1, 6	0,11	1, 7	0,12	1, 8	2, 0	2, 1
		1, 9	2, 2	0,13	2, 3	2, 4	1,10	2, 5	0,14
		2, 6	1,11	2, 7	0,15	1,12	2, 8	3, 0	3, 1
		0,16	2, 9	3, 2	1,13	3, 3			
v_f, j_f	0, 0		4.47D−11	8.33D−12	2.90D−12	7.11D−13	1.85D−13	4.80D−14	1.09D−14
		2.57D−15	2.69D−18	3.07D−18	6.16D−16	7.56D−18	8.70D−18	9.87D−18	1.40D−16
		8.50D−18	5.97D−18	2.88D−17	3.67D−18	5.89D−18	1.94D−18	4.94D−21	3.83D−21
		9.48D−19	5.88D−21	1.24D−18	2.11D−20	2.24D−20	4.22D−19	1.44D−20	2.65D−19
		1.61D−20	1.73D−19	1.10D−20	6.80D−20	8.57D−20	1.10D−20	5.27D−20	1.48D−20
		1.67D−20	1.54D−20	0.00D+00	4.08D−20	3.96D−20			
	0, 1	1.04D−10		5.97D−11	1.01D−11	3.24D−12	7.79D−13	1.96D−13	4.55D−14
		1.06D−14	8.49D−18	1.36D−17	2.56D−15	1.60D−17	2.80D−17	3.04D−17	5.87D−16
		2.71D−17	1.99D−17	1.22D−16	1.21D−17	2.51D−17	6.57D−18	8.69D−21	1.27D−20
		3.23D−18	1.91D−20	5.33D−18	6.23D−20	6.90D−20	1.45D−18	4.44D−20	1.15D−18
		4.96D−20	5.98D−19	3.41D−20	2.93D−19	2.98D−19	3.45D−20	1.57D−19	4.95D−20
		7.25D−20	5.02D−20	0.00D+00	1.44D−19	1.26D−19			
	0, 2	1.93D−11	5.97D−11		5.60D−11	8.94D−12	2.37D−12	5.90D−13	1.29D−13
		3.06D−14	1.45D−17	1.53D−17	7.32D−15	3.16D−17	4.10D−17	5.57D−17	1.70D−15
		5.16D−17	3.88D−17	3.54D−16	2.50D−17	7.37D−17	1.37D−17	1.69D−20	1.89D−20
		6.89D−18	3.02D−20	1.58D−17	1.13D−19	1.17D−19	3.15D−18	7.88D−20	3.43D−18
		8.79D−20	1.31D−18	6.05D−20	8.72D−19	6.57D−19	6.37D−20	2.61D−19	1.01D−19
		2.17D−19	9.83D−20	4.86D−20	3.24D−19	2.33D−19			
	0, 3	4.40D−12	6.58D−12	3.65D−11		4.88D−11	7.06D−12	1.74D−12	3.77D−13
		8.39D−14	1.34D−17	2.35D−17	2.00D−14	3.50D−17	6.64D−17	7.92D−17	4.67D−15
		8.54D−17	6.90D−17	9.73D−16	4.60D−17	2.03D−16	2.66D−17	1.74D−20	2.85D−20
		1.37D−17	4.55D−20	4.37D−17	1.59D−19	1.73D−19	6.43D−18	1.18D−19	9.57D−18
		1.35D−19	2.71D−18	9.43D−20	2.41D−18	1.36D−18	1.05D−19	3.68D−19	1.81D−19
		6.04D−19	1.76D−19	9.14D−20	6.81D−19	3.78D−19			
	0, 4	5.04D−13	9.91D−13	2.73D−12	2.29D−11		3.92D−11	5.79D−12	1.12D−12
		2.47D−13	2.10D−17	3.66D−17	5.51D−14	5.05D−17	7.12D−17	1.21D−16	1.29D−14
		1.27D−16	1.16D−16	2.66D−15	8.45D−17	5.53D−16	5.05D−17	2.83D−20	3.47D−20
		2.73D−17	6.06D−20	1.19D−16	2.21D−19	2.20D−19	1.32D−17	1.70D−19	2.61D−17
		1.95D−19	5.63D−18	1.42D−19	6.48D−18	2.81D−18	1.71D−19	4.86D−19	3.04D−19
		1.62D−18	3.12D−19	1.60D−19	1.43D−18	5.84D−19			
	0, 5	4.59D−14	8.34D−14	2.54D−13	1.16D−12	1.37D−11		3.23D−11	4.12D−12
		7.64D−13	3.28D−17	4.15D−17	1.64D−13	7.77D−17	9.60D−17	1.33D−16	3.68D−14
		2.03D−16	1.88D−16	7.44D−15	1.52D−16	1.53D−15	9.88D−17	2.09D−20	5.44D−20
		5.50D−17	8.14D−20	3.25D−16	2.89D−19	2.88D−19	2.75D−17	2.28D−19	7.12D−17
		2.81D−19	1.20D−17	2.15D−19	1.74D−17	5.95D−18	2.88D−19	6.31D−19	4.87D−19
		4.29D−18	5.68D−19	2.63D−19	3.03D−18	8.81D−19			
	0, 6	3.20D−15	5.63D−15	1.70D−14	7.66D−14	5.45D−13	8.69D−12		2.45D−11
		3.03D−12	4.08D−17	4.34D−17	5.29D−13	6.77D−17	1.60D−16	1.87D−16	1.15D−13
		2.46D−16	3.22D−16	2.20D−14	2.73D−16	4.38D−15	1.92D−16	2.93D−20	6.32D−20
		1.15D−16	1.24D−19	9.17D−16	3.64D−19	3.39D−19	5.89D−17	3.19D−19	1.98D−16
		3.93D−19	2.63D−17	3.42D−19	4.71D−17	1.30D−17	5.05D−19	8.09D−19	7.38D−19
		1.14D−17	1.06D−18	4.14D−19	6.54D−18	1.32D−18			
	0, 7	1.52D−16	2.75D−16	7.82D−16	3.50D−15	2.22D−14	2.32D−13	5.15D−12	
		1.91D−11	4.13D−17	4.13D−17	2.21D−12	5.89D−17	1.36D−16	3.79D−16	3.96D−13
		3.81D−16	4.38D−16	7.13D−14	5.13D−16	1.35D−14	3.82D−16	4.91D−20	9.87D−20
		2.42D−16	1.64D−19	2.70D−15	5.62D−19	4.20D−19	1.31D−16	4.31D−19	5.74D−16
		5.81D−19	5.94D−17	5.55D−19	1.32D−16	2.91D−17	9.45D−19	1.04D−18	1.07D−18
		3.10D−17	2.05D−18	6.00D−19	1.45D−17	1.94D−18			
	0, 8	6.02D−18	1.07D−17	3.09D−17	1.30D−16	8.15D−16	7.20D−15	1.06D−13	3.18D−12
			2.75D−17	3.20D−17	1.47D−11	4.75D−17	1.37D−16	4.08D−16	1.78D−12
		9.72D−16	7.47D−16	2.61D−13	8.07D−16	4.55D−14	7.96D−16	9.70D−20	1.36D−19
		5.32D−16	2.32D−19	8.60D−15	6.19D−19	5.38D−19	3.00D−16	5.68D−19	1.75D−15
		8.62D−19	1.41D−16	9.57D−19	3.85D−16	6.80D−17	1.81D−18	1.28D−18	1.43D−18
		8.63D−17	4.07D−18	8.15D−19	3.29D−17	2.78D−18			

Table 3. continued

v_f, j_f									
	1, 0	7.75D−23	1.06D−22	1.81D−22	2.55D−22	8.54D−22	3.81D−21	1.77D−20	8.49D−20
		3.39D−19		4.53D−11	8.28D−19	8.72D−12	3.16D−12	8.03D−13	1.05D−18
		2.43D−13	6.05D−14	7.73D−19	1.54D−14	4.26D−19	3.73D−15	6.99D−18	8.41D−18
		8.90D−16	2.08D−17	1.91D−19	2.53D−17	3.22D−17	2.15D−16	2.43D−17	6.92D−20
		1.90D−17	5.14D−17	1.25D−17	2.06D−20	1.34D−17	7.90D−18	5.08D−18	1.66D−18
		8.20D−21	5.88D−18	8.09D−19	3.47D−18	5.07D−18			
	1, 1	2.08D−22	3.97D−22	4.46D−22	1.05D−21	3.49D−21	1.13D−20	4.40D−20	1.99D−19
		9.25D−19	1.06D−10		2.69D−18	6.13D−11	1.07D−11	3.58D−12	3.85D−18
		1.01D−12	2.40D−13	3.01D−18	6.33D−14	1.72D−18	1.51D−14	2.63D−17	3.83D−17
		3.63D−15	4.31D−17	7.88D−19	8.41D−17	9.70D−17	8.81D−16	7.54D−17	2.88D−19
		6.14D−17	2.11D−16	3.99D−17	8.45D−20	5.53D−17	2.57D−17	1.54D−17	5.91D−18
		3.35D−20	1.92D−17	2.89D−18	1.43D−17	1.58D−17			
	0, 9	1.94D−19	3.48D−19	9.95D−19	4.17D−18	2.45D−17	2.08D−16	2.50D−15	4.97D−14
		1.98D−12	9.05D−18	1.25D−17		2.38D−17	1.12D−16	5.77D−16	1.23D−11
		1.61D−15	2.34D−15	1.25D−12	1.55D−15	1.77D−13	1.46D−15	1.40D−19	1.62D−19
		1.23D−15	2.61D−19	3.02D−14	7.67D−19	6.31D−19	7.23D−16	1.02D−18	5.79D−15
		1.31D−18	3.45D−16	1.68D−18	1.20D−15	1.67D−16	3.57D−18	1.44D−18	1.73D−18
		2.52D−16	8.16D−18	9.71D−19	7.71D−17	3.65D−18			
	1, 2	5.23D−22	4.78D−22	9.42D−22	1.60D−21	4.92D−21	2.16D−20	7.01D−20	2.90D−19
		1.40D−18	2.09D−11	6.26D−11	5.23D−18		5.85D−11	9.30D−12	9.11D−18
		3.01D−12	6.96D−13	7.83D−18	1.75D−13	4.69D−18	4.25D−14	4.19D−17	4.65D−17
		1.01D−14	9.07D−17	2.21D−18	1.22D−16	1.72D−16	2.46D−15	1.37D−16	8.21D−19
		1.13D−16	5.94D−16	7.65D−17	2.35D−19	1.55D−16	4.96D−17	2.40D−17	1.19D−17
		9.26D−20	3.76D−17	6.76D−18	4.02D−17	2.83D−17			
	1, 3	4.06D−22	5.62D−22	8.24D−22	2.05D−21	4.69D−21	1.80D−20	1.12D−19	4.51D−19
		2.73D−18	5.11D−12	7.38D−12	1.65D−17	3.95D−11		5.00D−11	2.17D−17
		8.51D−12	1.96D−12	1.97D−17	4.99D−13	1.23D−17	1.13D−13	4.36D−17	7.47D−17
		2.69D−14	1.05D−16	5.95D−18	2.04D−16	2.35D−16	6.52D−15	2.13D−16	2.21D−18
		1.85D−16	1.57D−15	1.27D−16	6.13D−19	4.06D−16	8.68D−17	3.33D−17	2.17D−17
		2.39D−19	6.65D−17	1.26D−17	1.04D−16	4.35D−17			
	1, 4	2.25D−22	2.99D−22	5.48D−22	1.19D−21	3.91D−21	1.22D−20	6.40D−20	6.17D−19
		3.98D−18	6.35D−13	1.21D−12	4.18D−17	3.07D−12	2.45D−11		9.16D−17
		4.39D−11	6.19D−12	5.73D−17	1.45D−12	3.43D−17	3.24D−13	6.95D−17	1.18D−16
		7.23D−14	1.65D−16	1.64D−17	2.25D−16	3.41D−16	1.73D−14	2.90D−16	6.02D−18
		2.81D−16	4.13D−15	2.06D−16	1.59D−18	1.05D−15	1.45D−16	4.24D−17	3.50D−17
		6.09D−19	1.16D−16	2.24D−17	2.64D−16	6.43D−17			
	0,10	4.85D−21	8.78D−21	2.54D−20	1.07D−19	6.30D−19	5.14D−18	5.97D−17	9.81D−16
		2.64D−14	1.26D−18	1.97D−18	1.36D−12	4.58D−18	1.61D−17	1.39D−16	
		1.85D−15	5.76D−15	9.45D−12	5.80D−15	9.06D−13	3.09D−15	1.30D−19	1.36D−19
		2.65D−15	2.19D−19	1.23D−13	6.69D−19	8.27D−19	1.85D−15	1.67D−18	2.12D−14
		2.66D−18	9.02D−16	2.53D−18	4.06D−15	4.28D−16	7.22D−18	1.38D−18	1.78D−18
		7.75D−16	1.68D−17	9.91D−19	1.89D−16	4.09D−18			
	1, 5	7.18D−23	9.86D−23	1.88D−22	4.77D−22	1.51D−21	6.90D−21	3.11D−20	2.30D−19
		3.51D−18	7.12D−14	1.25D−13	4.32D−17	3.68D−13	1.54D−12	1.62D−11	4.49D−16
			3.41D−11	2.23D−16	5.08D−12	1.10D−16	9.68D−13	1.10D−16	1.41D−16
		2.10D−13	2.44D−16	4.88D−17	2.89D−16	3.51D−16	4.74D−14	4.22D−16	1.71D−17
		4.07D−16	1.11D−14	3.25D−16	4.25D−18	2.75D−15	2.49D−16	5.40D−17	5.35D−17
		1.60D−18	2.04D−16	3.57D−17	6.66D−16	9.51D−17			
	1, 6	1.45D−23	2.08D−23	4.05D−23	1.11D−22	3.97D−22	1.83D−21	1.17D−20	7.56D−20
		7.74D−19	5.08D−15	8.58D−15	1.80D−17	2.44D−14	1.02D−13	6.57D−13	4.02D−16
		9.79D−12		1.50D−15	2.89D−11	4.08D−16	3.65D−12	1.36D−16	1.46D−16
		6.57D−13	2.27D−16	1.62D−16	5.06D−16	4.94D−16	1.41D−13	4.72D−16	5.23D−17
		6.33D−16	3.13D−14	5.12D−16	1.19D−17	7.45D−15	4.33D−16	7.14D−17	8.03D−17
		4.51D−18	3.82D−16	5.37D−17	1.73D−15	1.47D−16			
	0,11	9.14D−23	1.66D−22	4.86D−22	2.04D−21	1.19D−20	9.52D−20	1.05D−18	1.61D−17
		3.54D−16	8.52D−20	1.41D−19	1.26D−14	3.60D−19	1.34D−18	7.97D−18	8.64D−13
		8.39D−17	1.96D−15		1.99D−14	7.51D−12	1.21D−14	7.15D−20	7.42D−20
		6.38D−15	1.22D−19	6.69D−13	3.95D−19	1.06D−18	4.56D−15	2.77D−18	9.14D−14
		5.27D−18	2.52D−15	3.80D−18	1.54D−14	1.18D−15	1.23D−17	1.10D−18	1.48D−18
		2.62D−15	3.50D−17	8.93D−19	4.85D−16	3.53D−18			

Table 3. continued

v_f, j_f									
	1, 7	2.01D−24	2.87D−24	5.92D−24	1.67D−23	6.54D−23	3.36D−22	2.24D−21	2.01D−20
		1.89D−19	2.92D−16	5.13D−16	2.70D−18	1.39D−15	5.87D−15	3.47D−14	9.16D−17
		3.30D−13	6.55D−12	3.44D−15		1.99D−15	2.17D−11	1.25D−16	1.23D−16
		2.65D−12	1.92D−16	6.10D−16	3.98D−16	8.14D−16	4.63D−13	7.01D−16	1.72D−16
		8.02D−16	9.69D−14	8.74D−16	3.57D−17	2.16D−14	7.69D−16	9.38D−17	1.09D−16
		1.42D−17	7.48D−16	8.10D−17	4.65D−15	2.31D−16			
	0,12	1.44D−24	2.65D−24	7.78D−24	3.29D−23	1.91D−22	1.51D−21	1.61D−20	2.35D−19
		4.76D−18	3.62D−21	6.20D−21	1.37D−16	1.66D−20	6.47D−20	3.67D−19	6.39D−15
		3.17D−18	4.12D−17	5.78D−13	8.88D−16		3.69D−14	2.28D−20	2.54D−20
		2.73D−14	4.45D−20	6.00D−12	1.65D−19	8.57D−19	1.24D−14	3.79D−18	5.23D−13
		9.60D−18	6.97D−15	7.74D−18	6.94D−14	3.57D−15	2.08D−17	7.75D−19	1.06D−18
		9.91D−15	7.59D−17	7.87D−19	1.39D−15	2.33D−18			
	1, 8	1.93D−25	2.82D−25	5.88D−25	1.75D−24	7.10D−24	3.96D−23	2.87D−22	2.72D−21
		3.39D−20	1.29D−17	2.22D−17	4.62D−19	6.13D−17	2.42D−16	1.42D−15	8.88D−18
		1.14D−14	1.50D−13	3.79D−16	3.95D−12	1.50D−14		7.49D−17	8.24D−17
		1.69D−11	1.34D−16	2.91D−15	3.78D−16	8.91D−16	1.98D−12	1.80D−15	6.47D−16
		1.37D−15	3.37D−13	1.27D−15	1.18D−16	6.96D−14	1.53D−15	1.11D−16	1.45D−16
		5.18D−17	1.66D−15	9.89D−17	1.37D−14	3.29D−16			
	2, 0	6.85D−30	5.20D−30	1.01D−29	1.59D−29	5.53D−29	1.17D−28	6.10D−28	4.86D−27
		5.75D−26	3.36D−22	5.39D−22	6.16D−25	8.41D−22	1.30D−21	4.22D−21	5.20D−24
		1.80D−20	7.78D−20	3.12D−23	3.16D−19	1.29D−22	1.04D−18		4.51D−11
		2.15D−18	9.07D−12	3.62D−22	3.49D−12	8.87D−13	2.33D−18	2.60D−13	6.20D−22
		7.80D−14	1.40D−18	2.22D−14	1.42D−21	1.15D−18	6.47D−15	3.48D−16	2.33D−16
		1.13D−20	1.95D−15	9.06D−17	5.49D−18	5.46D−16			
	2, 1	1.26D−29	1.80D−29	2.68D−29	6.19D−29	1.61D−28	7.20D−28	3.12D−27	2.32D−26
		1.92D−25	9.59D−22	1.86D−21	1.70D−24	2.21D−21	5.27D−21	1.71D−20	1.29D−23
		5.50D−20	1.99D−19	7.68D−23	7.39D−19	3.42D−22	2.72D−18	1.07D−10	
		6.62D−18	6.29D−11	1.10D−21	1.15D−11	3.97D−12	8.13D−18	1.05D−12	2.23D−21
		3.04D−13	5.26D−18	8.93D−14	6.77D−21	4.65D−18	2.57D−14	9.11D−16	7.39D−16
		5.47D−20	7.63D−15	3.48D−16	2.33D−17	1.68D−15			
	1, 9	1.40D−26	2.05D−26	4.38D−26	1.33D−25	5.68D−25	3.26D−24	2.54D−23	2.55D−22
		3.35D−21	4.55D−19	7.89D−19	5.77D−20	2.15D−18	8.51D−18	4.67D−17	1.13D−18
		3.67D−16	4.00D−15	2.96D−17	7.13D−14	1.64D−15	2.51D−12	2.28D−17	2.96D−17
			5.88D−17	2.75D−14	2.74D−16	1.43D−15	1.34D−11	3.15D−15	2.82D−15
		4.69D−15	1.56D−12	2.11D−15	4.45D−16	2.58D−13	2.67D−15	1.15D−16	1.62D−16
		2.22D−16	4.26D−15	1.18D−16	4.50D−14	4.18D−16			
	2, 2	2.02D−29	2.82D−29	4.47D−29	1.03D−28	2.93D−28	1.13D−27	6.40D−27	4.03D−26
		3.40D−25	2.47D−21	2.19D−21	2.85D−24	4.51D−21	7.74D−21	2.48D−20	2.17D−23
		9.91D−20	3.22D−19	1.32D−22	1.20D−18	6.25D−22	4.64D−18	2.24D−11	6.57D−11
		1.37D−17		2.36D−21	6.09D−11	1.01D−11	1.93D−17	3.09D−12	5.92D−21
		8.64D−13	1.37D−17	2.38D−13	2.23D−20	1.26D−17	7.04D−14	1.88D−15	1.55D−15
		1.86D−19	2.01D−14	6.98D−16	6.79D−17	2.96D−15			
	0,13	2.00D−26	3.70D−26	1.10D−25	4.65D−25	2.70D−24	2.11D−23	2.21D−22	3.10D−21
		5.91D−20	1.07D−22	1.87D−22	1.54D−18	5.15D−22	2.05D−21	1.15D−20	5.72D−17
		9.30D−20	1.07D−18	3.39D−15	1.79D−17	3.95D−13	4.70D−16	4.20D−21	5.37D−21
		3.00D−14	1.11D−20		3.97D−20	2.75D−19	6.33D−14	2.41D−18	4.99D−12
		1.26D−17	2.06D−14	1.84D−17	4.21D−13	1.09D−14	4.55D−17	5.45D−19	7.54D−19
		4.63D−14	2.14D−16	8.05D−19	4.59D−15	1.90D−18			
	2, 3	5.04D−29	6.43D−29	1.16D−28	2.52D−28	7.45D−28	2.78D−27	1.31D−26	9.58D−26
		6.33D−25	2.10D−21	2.97D−21	5.83D−24	4.23D−21	1.05D−20	2.36D−20	4.61D−23
		8.18D−20	5.00D−19	2.98D−22	1.74D−18	1.61D−21	9.07D−18	6.02D−12	8.33D−12
		4.45D−17	4.25D−11	5.90D−21		5.40D−11	4.55D−17	8.50D−12	1.37D−20
		2.41D−12	3.44D−17	6.56D−13	6.71D−20	3.44D−17	1.83D−13	1.95D−15	1.79D−15
		6.07D−19	5.11D−14	1.72D−15	1.90D−16	5.47D−15			
	2, 4	2.74D−29	3.64D−29	6.15D−29	1.39D−28	3.80D−28	1.42D−27	6.22D−27	3.66D−26
		2.81D−25	1.36D−21	1.75D−21	2.45D−24	3.03D−21	6.17D−21	1.82D−20	2.91D−23
		5.08D−20	2.49D−19	4.07D−22	1.82D−18	4.28D−21	1.09D−17	7.82D−13	1.48D−12
		1.19D−16	3.61D−12	2.09D−20	2.76D−11		2.14D−16	4.63D−11	4.43D−20
		7.45D−12	1.18D−16	1.84D−12	1.83D−19	1.00D−16	5.14D−13	2.54D−15	3.83D−15
		1.92D−18	1.32D−13	2.44D−15	5.38D−16	1.08D−14			

Table 3. continued

v_f, j_f									
	1,10	7.59D−28	1.13D−27	2.45D−27	7.65D−27	3.34D−26	2.00D−25	1.59D−24	1.69D−23
		2.30D−22	1.34D−20	2.34D−20	4.13D−21	6.40D−20	2.51D−19	1.36D−18	9.57D−20
		1.01D−17	1.05D−16	2.58D−18	1.52D−15	9.09D−17	3.58D−14	3.02D−18	4.45D−18
		1.64D−12	1.01D−17	7.07D−15	3.42D−17	3.15D−16		4.50D−15	1.98D−14
		1.34D−14	1.16D−11	1.04D−14	2.12D−15	1.28D−12	6.02D−15	1.24D−16	1.91D−16
		1.12D−15	1.32D−14	1.59D−16	1.78D−13	6.24D−16			
	2, 5	6.88D−30	9.13D−30	1.62D−29	3.71D−29	1.14D−28	4.38D−28	2.28D−27	1.47D−26
		1.16D−25	4.01D−22	5.31D−22	1.54D−24	9.43D−22	2.18D−21	6.06D−21	2.29D−23
		2.38D−20	9.29D−20	4.16D−22	6.10D−19	7.39D−21	8.63D−18	8.96D−14	1.52D−13
		1.02D−16	4.29D−13	7.15D−20	1.70D−12	1.81D−11	1.19D−15		1.57D−19
		3.87D−11	4.61D−16	5.89D−12	4.74D−19	3.15D−16	1.44D−12	3.48D−15	5.99D−15
		5.89D−18	3.58D−13	5.35D−15	1.49D−15	2.57D−14			
	0,14	2.43D−28	4.53D−28	1.35D−27	5.79D−27	3.37D−26	2.63D−25	2.72D−24	3.75D−23
		6.85D−22	2.20D−24	3.90D−24	1.68D−20	1.09D−23	4.35D−23	2.42D−22	5.60D−19
		1.85D−21	1.98D−20	2.63D−17	2.87D−19	1.96D−15	5.95D−18	4.09D−22	6.21D−22
		1.76D−16	1.58D−21	2.84D−13	5.25D−21	3.32D−20	1.01D−14	3.01D−19	
		3.11D−18	1.37D−13	2.73D−17	4.33D−12	3.77D−14	1.08D−16	4.23D−19	6.87D−19
		3.12D−13	7.39D−16	9.20D−19	1.91D−14	3.74D−18			
	2, 6	2.34D−30	3.12D−30	5.53D−30	1.30D−29	4.02D−29	1.65D−28	8.58D−28	6.05D−27
		5.37D−26	9.61D−23	1.32D−22	6.07D−25	2.38D−22	5.78D−22	1.80D−21	1.12D−23
		7.03D−21	3.81D−20	2.42D−22	2.13D−19	5.72D−21	2.00D−18	8.21D−15	1.35D−14
		4.64D−17	3.67D−14	1.14D−19	1.47D−13	8.88D−13	1.09D−15	1.18D−11	4.96D−19
			3.11D−15	3.09D−11	1.23D−18	1.13D−15	4.95D−12	8.41D−15	1.29D−14
		1.79D−17	1.01D−12	1.26D−14	4.34D−15	5.30D−14			
	1,11	3.18D−29	4.75D−29	1.04D−28	3.30D−28	1.46D−27	8.88D−27	7.24D−26	7.80D−25
		1.11D−23	3.28D−22	5.75D−22	2.01D−22	1.58D−21	6.19D−21	3.33D−20	4.78D−21
		2.41D−19	2.38D−18	1.46D−19	3.25D−17	5.24D−18	6.24D−16	1.85D−19	2.94D−19
		1.95D−14	7.34D−19	2.36D−16	2.64D−18	1.78D−17	1.18D−12	1.78D−16	2.75D−14
		3.93D−15		4.13D−14	1.31D−14	9.70D−12	3.41D−14	1.10D−16	1.80D−16
		6.04D−15	5.41D−14	1.94D−16	9.49D−13	9.12D−16			
	2, 7	3.91D−31	5.22D−31	9.27D−31	2.22D−30	7.13D−30	3.08D−29	1.82D−28	1.41D−27
		1.45D−26	1.54D−23	2.10D−23	1.89D−25	3.93D−23	9.67D−23	3.20D−22	2.59D−24
		1.37D−21	7.52D−21	4.25D−23	5.66D−20	1.12D−21	4.52D−19	5.69D−16	9.65D−16
		5.10D−18	2.46D−15	4.06D−20	9.74D−15	5.33D−14	2.06D−16	4.39D−13	1.06D−18
		7.54D−12	7.97D−15		3.23D−18	6.53D−15	2.65D−11	1.36D−14	2.26D−14
		6.07D−17	3.77D−12	1.80D−14	1.43D−14	9.16D−14			
	0,15	3.11D−30	5.78D−30	1.72D−29	7.29D−29	4.18D−28	3.20D−27	3.23D−26	4.30D−25
		7.53D−24	3.27D−26	5.71D−26	1.74D−22	1.55D−25	6.01D−25	3.19D−24	5.34D−21
		2.30D−23	2.25D−22	2.22D−19	2.98D−21	1.30D−17	5.41D−20	4.70D−23	9.41D−23
		1.38D−18	2.97D−22	1.20D−15	1.28D−21	6.85D−21	5.38D−17	4.54D−20	2.16D−13
		3.84D−19	3.25D−15	4.16D−18		2.86D−13	1.18D−16	2.13D−19	4.04D−19
		3.55D−12	1.74D−15	6.61D−19	1.10D−13	4.02D−18			
	1,12	1.37D−30	2.05D−30	4.53D−30	1.43D−29	6.35D−29	3.83D−28	3.10D−27	3.32D−26
		4.65D−25	7.45D−24	1.31D−23	8.46D−24	3.58D−23	1.39D−22	7.33D−22	1.97D−22
		5.20D−21	4.92D−20	5.95D−21	6.31D−19	2.33D−19	1.12D−17	1.33D−20	2.26D−20
		2.80D−16	5.89D−20	1.08D−17	2.30D−19	1.31D−18	1.14D−14	1.06D−17	6.58D−16
		1.24D−16	8.42D−13	2.94D−15	9.98D−14		1.20D−13	5.80D−17	1.02D−16
		3.39D−14	3.18D−13	1.40D−16	7.75D−12	8.23D−16			
	2, 8	7.72D−32	1.04D−31	1.93D−31	4.87D−31	1.70D−30	8.15D−30	5.31D−29	4.73D−28
		5.41D−27	1.92D−24	2.67D−24	7.94D−26	5.03D−24	1.31D−23	4.46D−23	1.46D−24
		2.07D−22	1.25D−21	2.72D−23	9.84D−21	5.97D−22	1.08D−19	3.27D−17	5.48D−17
		1.27D−18	1.44D−16	1.98D−20	5.36D−16	2.95D−15	2.35D−17	2.12D−14	8.30D−19
		2.38D−13	1.30D−15	5.24D−12	1.82D−17	5.26D−14		1.03D−14	1.70D−14
		1.67D−16	2.08D−11	1.82D−14	4.63D−14	1.07D−13			
	3, 0	5.79D−33	7.44D−33	1.24D−32	2.68D−32	7.54D−32	2.79D−31	1.33D−30	8.19D−30
		6.00D−29	1.94D−26	2.50D−26	5.02D−28	3.82D−26	7.85D−26	2.04D−25	4.38D−27
		7.03D−25	3.24D−24	3.82D−26	1.88D−23	3.48D−25	1.23D−22	2.76D−20	3.05D−20
		8.55D−22	6.03D−20	3.73D−24	8.98D−20	2.29D−19	7.60D−21	8.02D−19	5.08D−23
		6.34D−18	6.59D−20	4.21D−17	5.11D−22	3.99D−19	1.61D−16		4.64D−11
		2.80D−21	4.36D−16	8.85D−12	1.41D−18	4.95D−12			

Table 3. continued

v_f, j_f									
	3, 1	3.91D−33	5.63D−33	1.15D−32	3.16D−32	1.13D−31	5.17D−31	2.92D−30	2.02D−29
		1.61D−28	1.52D−26	2.30D−26	1.45D−27	4.54D−26	1.23D−25	4.04D−25	1.36D−26
		1.67D−24	8.74D−24	1.23D−25	5.25D−23	1.14D−24	3.83D−22	4.43D−20	5.92D−20
		2.90D−21	1.19D−19	1.24D−23	1.97D−19	8.26D−19	2.79D−20	3.31D−18	1.98D−22
		2.33D−17	2.58D−19	1.67D−16	2.33D−21	1.69D−18	6.38D−16	1.11D−10	
		1.42D−20	1.77D−15	6.04D−11	6.34D−18	1.63D−11			
	0,16	3.38D−32	6.34D−32	1.90D−31	8.09D−31	4.64D−30	3.51D−29	3.47D−28	4.48D−27
		7.49D−26	5.77D−28	1.01D−27	1.62D−24	2.72D−27	1.04D−26	5.41D−26	4.53D−23
		3.85D−25	3.78D−24	1.67D−21	5.27D−23	8.22D−20	1.05D−21	1.65D−23	3.37D−23
		3.06D−20	1.10D−22	5.84D−18	5.15D−22	3.19D−21	1.27D−18	2.50D−20	6.92D−16
		2.49D−19	6.66D−17	3.46D−18	1.57D−13	4.31D−15	4.82D−17	5.16D−20	1.09D−19
			1.55D−15	2.18D−19	8.06D−13	1.66D−18			
	2, 9	1.75D−32	2.46D−32	4.82D−32	1.32D−31	5.01D−31	2.60D−30	1.81D−29	1.66D−28
		1.98D−27	2.32D−25	3.22D−25	2.95D−26	6.19D−25	1.62D−24	5.77D−24	5.52D−25
		2.75D−23	1.80D−22	1.25D−23	1.55D−21	3.53D−22	1.89D−20	1.60D−18	2.64D−18
		3.29D−19	6.67D−18	1.52D−20	2.43D−17	1.23D−16	8.34D−18	8.52D−16	9.18D−19
		7.85D−15	3.35D−16	1.21D−13	4.32D−17	2.26D−14	3.37D−12	4.51D−15	7.66D−15
		8.67D−16		1.22D−14	3.25D−13	7.44D−14			
	3, 2	0.00D+00	0.00D+00	5.90D−33	1.70D−32	6.35D−32	2.98D−31	1.74D−30	1.20D−29
		9.80D−29	7.88D−27	1.20D−26	8.66D−28	2.75D−26	7.60D−26	2.76D−25	8.03D−27
		1.19D−24	6.24D−24	7.90D−26	4.15D−23	9.04D−25	2.79D−22	1.84D−20	2.98D−20
		2.25D−21	5.72D−20	1.41D−23	2.02D−19	5.61D−19	2.48D−20	3.15D−18	2.83D−22
		2.43D−17	2.96D−19	1.42D−16	4.06D−21	2.46D−18	7.28D−16	2.26D−11	6.44D−11
		3.03D−20	3.02D−15		1.20D−17	7.57D−11			
	1,13	4.87D−32	7.40D−32	1.67D−31	5.38D−31	2.40D−30	1.46D−29	1.17D−28	1.23D−27
		1.68D−26	1.44D−25	2.53D−25	2.92D−25	6.94D−25	2.67D−24	1.38D−23	6.49D−24
		9.42D−23	8.51D−22	1.82D−22	1.01D−20	6.80D−21	1.64D−19	4.73D−21	8.46D−21
		3.65D−18	2.36D−20	3.40D−19	9.50D−20	5.25D−19	1.18D−16	3.72D−18	2.50D−17
		3.56D−17	6.16D−15	4.80D−16	2.86D−15	5.79D−13	7.89D−15	1.53D−17	2.87D−17
		4.75D−13	3.41D−13	5.12D−17		3.24D−16			
	3, 3	8.01D−33	1.10D−32	2.03D−32	5.05D−32	1.67D−31	7.17D−31	3.99D−30	2.79D−29
		2.40D−28	3.56D−26	4.71D−26	2.34D−27	8.29D−26	1.88D−25	5.70D−25	2.38D−26
		2.28D−24	1.22D−23	2.25D−25	8.53D−23	1.93D−24	6.67D−22	7.97D−20	1.04D−19
		5.73D−21	1.74D−19	2.38D−23	4.62D−19	1.79D−18	7.02D−20	1.09D−17	8.25D−22
		7.35D−17	1.00D−18	5.21D−16	1.78D−20	1.04D−17	3.09D−15	9.10D−12	1.25D−11
		1.66D−19	1.32D−14	5.44D−11	5.49D−17				

Table 4. Collision rate coefficients in cubic centimeters per second for a temperature $T = 1000$ K. xDy denotes $x \times 10^y$

v_i, j_i		0, 0	0, 1	0, 2	0, 3	0, 4	0, 5	0, 6	0, 7
		0, 8	1, 0	1, 1	0, 9	1, 2	1, 3	1, 4	0,10
		1, 5	1, 6	0,11	1, 7	0,12	1, 8	2, 0	2, 1
		1, 9	2, 2	0,13	2, 3	2, 4	1,10	2, 5	0,14
		2, 6	1,11	2, 7	0,15	1,12	2, 8	3, 0	3, 1
		0,16	2, 9	3, 2	1,13	3, 3			
v_f, j_f	0, 0		6.55D−11	1.34D−11	6.51D−12	2.14D−12	7.62D−13	2.74D−13	9.13D−14
		3.05D−14	1.88D−17	2.57D−17	9.79D−15	6.93D−17	8.73D−17	1.15D−16	3.00D−15
		1.30D−16	1.15D−16	8.93D−16	9.22D−17	2.61D−16	6.32D−17	1.09D−19	6.21D−20
		4.00D−17	1.11D−19	7.63D−17	5.11D−19	7.98D−19	2.32D−17	5.35D−19	2.24D−17
		8.32D−19	1.24D−17	6.56D−19	6.61D−18	6.45D−18	5.49D−19	5.32D−18	8.76D−19
		1.34D−18	9.74D−19	4.20D−19	2.82D−18	1.80D−18			
	0, 1	1.73D−10		9.28D−11	1.97D−11	8.53D−12	2.91D−12	9.87D−13	3.42D−13
		1.13D−13	8.52D−17	1.30D−16	3.68D−14	1.40D−16	2.71D−16	3.53D−16	1.14D−14
		3.84D−16	3.70D−16	3.43D−15	2.91D−16	1.02D−15	2.05D−16	1.94D−19	2.17D−19
		1.30D−16	3.76D−19	3.00D−16	1.44D−18	2.40D−18	7.62D−17	1.65D−18	8.89D−17
		2.53D−18	4.11D−17	2.01D−18	2.68D−17	2.16D−17	1.68D−18	1.56D−17	2.91D−18
		5.42D−18	3.08D−18	1.46D−18	9.51D−18	5.67D−18			
	0, 2	4.57D−11	1.20D−10		9.32D−11	1.93D−11	7.38D−12	2.52D−12	8.19D−13
		2.79D−13	2.18D−16	1.59D−16	9.10D−14	2.89D−16	3.86D−16	5.91D−16	2.85D−14
		6.87D−16	6.52D−16	8.71D−15	5.49D−16	2.61D−15	3.89D−16	3.33D−19	2.93D−19
		2.55D−16	6.67D−19	7.83D−16	2.63D−18	4.01D−18	1.52D−16	2.83D−18	2.36D−16
		4.41D−18	8.31D−17	3.45D−18	7.26D−17	4.46D−17	2.99D−18	2.54D−17	5.91D−18
		1.48D−17	5.73D−18	3.04D−18	1.98D−17	1.03D−17			
	0, 3	2.12D−11	2.43D−11	8.91D−11		8.77D−11	1.76D−11	6.00D−12	1.99D−12
		6.36D−13	1.42D−16	2.90D−16	2.11D−13	3.53D−16	6.19D−16	7.91D−16	6.66D−14
		1.01D−15	1.04D−15	2.05D−14	8.83D−16	6.21D−15	6.68D−16	4.40D−19	4.89D−19
		4.47D−16	1.09D−18	1.88D−15	3.46D−18	5.78D−18	2.74D−16	4.11D−18	5.74D−16
		6.43D−18	1.53D−16	5.12D−18	1.81D−16	8.46D−17	4.62D−18	3.42D−17	1.05D−17
		3.70D−17	9.51D−18	5.62D−18	3.80D−17	1.62D−17			
	0, 4	5.40D−12	8.17D−12	1.44D−11	6.81D−11		7.86D−11	1.58D−11	4.74D−12
		1.54D−12	2.09D−16	3.41D−16	4.85D−13	5.86D−16	7.26D−16	1.14D−15	1.53D−13
		1.33D−15	1.49D−15	4.73D−14	1.40D−15	1.44D−14	1.08D−15	7.97D−19	7.70D−19
		7.69D−16	1.71D−18	4.40D−15	4.88D−18	7.42D−18	4.84D−16	5.64D−18	1.35D−15
		8.82D−18	2.78D−16	7.09D−18	4.35D−16	1.59D−16	6.97D−18	4.25D−17	1.72D−17
		8.92D−17	1.54D−17	9.58D−18	7.15D−17	2.39D−17			
	0, 5	1.26D−12	1.82D−12	3.58D−12	8.95D−12	5.15D−11		7.00D−11	1.34D−11
		3.75D−12	3.84D−16	5.00D−16	1.19D−12	7.70D−16	1.07D−15	1.25D−15	3.60D−13
		1.86D−15	2.06D−15	1.10D−13	2.09D−15	3.34D−14	1.78D−15	6.96D−19	1.40D−18
		1.30D−15	2.92D−18	1.02D−14	6.07D−18	9.70D−18	8.57D−16	7.27D−18	3.13D−15
		1.16D−17	5.06D−16	9.61D−18	1.02D−15	2.99D−16	1.07D−17	5.06D−17	2.68D−17
		2.11D−16	2.51D−17	1.53D−17	1.35D−16	3.40D−17			
	0, 6	2.55D−13	3.48D−13	6.89D−13	1.72D−12	5.82D−12	3.94D−11		6.00D−11
		1.13D−11	6.56D−16	6.78D−16	3.00D−12	8.73D−16	1.40D−15	1.77D−15	9.01D−13
		2.05D−15	2.99D−15	2.64D−13	3.11D−15	7.87D−14	2.84D−15	1.44D−18	2.49D−18
		2.26D−15	4.32D−18	2.39D−14	8.46D−18	1.15D−17	1.52D−15	9.48D−18	7.28D−15
		1.52D−17	9.28D−16	1.32D−17	2.41D−15	5.69D−16	1.67D−17	5.90D−17	3.88D−17
		4.97D−16	4.16D−17	2.31D−17	2.57D−16	4.75D−17			
	0, 7	4.19D−14	5.95D−14	1.10D−13	2.80D−13	8.60D−13	3.72D−12	2.95D−11	
		5.14D−11	7.64D−16	8.04D−16	9.46D−12	9.16D−16	1.37D−15	2.59D−15	2.39D−12
		2.99D−15	3.49D−15	6.76D−13	4.82D−15	1.94D−13	4.61D−15	3.05D−18	4.08D−18
		3.87D−15	7.17D−18	5.74D−14	1.23D−17	1.49D−17	2.78D−15	1.21D−17	1.73D−14
		2.04D−17	1.72D−15	1.80D−17	5.71D−15	1.10D−15	2.80D−17	6.90D−17	5.33D−17
		1.18D−15	7.06D−17	3.18D−17	4.97D−16	6.50D−17			
	0, 8	6.08D−15	8.58D−15	1.63D−14	3.90D−14	1.21D−13	4.53D−13	2.42D−12	2.24D−11
			6.70D−16	7.01D−16	4.39D−11	8.39D−16	1.29D−15	2.56D−15	7.97D−12
		5.28D−15	5.33D−15	1.87D−12	6.16D−15	5.12D−13	7.72D−15	5.16D−18	6.44D−18
		6.83D−15	9.41D−18	1.45D−13	1.36D−17	1.66D−17	5.07D−15	1.53D−17	4.23D−14
		2.74D−17	3.28D−15	2.56D−17	1.38D−14	2.14D−15	4.66D−17	7.66D−17	6.57D−17
		2.86D−15	1.21D−16	4.02D−17	9.71D−16	8.64D−17			

Table 4. continued

v_f, j_f									
	1, 0	1.01D−19	1.74D−19	3.43D−19	2.35D−19	4.44D−19	1.25D−18	3.78D−18	8.94D−18
		1.80D−17		6.56D−11	2.67D−17	1.36D−11	6.87D−12	2.33D−12	2.90D−17
		8.75D−13	3.26D−13	2.39D−17	1.14D−13	1.60D−17	3.94D−14	4.63D−17	7.45D−17
		1.34D−14	1.79D−16	9.49D−18	2.34D−16	3.65D−16	4.41D−15	3.34D−16	4.71D−18
		3.19D−16	1.47D−15	2.73D−16	1.51D−18	4.98D−16	1.87D−16	2.63D−16	5.46D−17
		9.11D−19	1.72D−16	2.60D−17	1.21D−16	1.18D−16			
	1, 1	3.66D−19	7.04D−19	6.67D−19	1.27D−18	1.93D−18	4.31D−18	1.04D−17	2.50D−17
		5.01D−17	1.74D−10		8.05D−17	9.39D−11	2.03D−11	9.22D−12	9.31D−17
		3.29D−12	1.15D−12	8.07D−17	4.21D−13	5.61D−17	1.44D−13	2.79D−16	3.44D−16
		4.93D−14	3.53D−16	3.42D−17	7.86D−16	1.10D−15	1.64D−14	9.79D−16	1.73D−17
		1.00D−15	5.51D−15	8.36D−16	5.61D−18	1.90D−15	5.91D−16	7.91D−16	1.89D−16
		3.45D−18	5.44D−16	9.19D−17	4.68D−16	3.61D−16			
	0, 9	7.58D−16	1.08D−15	2.07D−15	5.02D−15	1.49D−14	5.55D−14	2.49D−13	1.60D−12
		1.70D−11	3.85D−16	4.37D−16		5.64D−16	9.61D−16	2.42D−15	3.83D−11
		6.10D−15	1.13D−14	6.52D−12	9.80D−15	1.48D−12	1.10D−14	8.38D−18	8.98D−18
		1.24D−14	1.17D−17	3.94D−13	1.65D−17	1.95D−17	9.61D−15	2.22D−17	1.09D−13
		4.04D−17	6.29D−15	3.68D−17	3.46D−14	4.27D−15	7.88D−17	7.86D−17	7.28D−17
		7.12D−15	2.08D−16	4.30D−17	1.93D−15	1.05D−16			
	1, 2	1.29D−18	9.85D−19	1.58D−18	2.02D−18	4.32D−18	8.66D−18	1.74D−17	3.71D−17
		7.82D−17	4.72D−11	1.22D−10	1.35D−16		9.52D−11	2.00D−11	1.77D−16
		8.26D−12	2.87D−12	1.67D−16	9.82D−13	1.24D−16	3.47D−13	6.11D−16	4.88D−16
		1.18D−13	7.82D−16	7.85D−17	1.08D−15	1.83D−15	3.97D−14	1.71D−15	4.09D−17
		1.70D−15	1.34D−14	1.50D−15	1.34D−17	4.73D−15	1.07D−15	1.18D−15	3.74D−16
		8.52D−18	1.01D−15	2.15D−16	1.19D−15	6.34D−16			
	1, 3	1.58D−18	1.86D−18	2.05D−18	3.44D−18	5.20D−18	1.17D−17	2.72D−17	5.38D−17
		1.17D−16	2.31D−11	2.57D−11	2.24D−16	9.25D−11		8.92D−11	3.12D−16
		1.90D−11	6.67D−12	3.23D−16	2.33D−12	2.53D−16	7.72D−13	4.58D−16	8.65D−16
		2.67D−13	1.09D−15	1.67D−16	1.86D−15	2.44D−15	8.96D−14	2.46D−15	8.91D−17
		2.58D−15	3.02D−14	2.22D−15	2.95D−17	1.09D−14	1.70D−15	1.53D−15	6.66D−16
		1.93D−17	1.64D−15	3.93D−16	2.78D−15	9.29D−16			
	1, 4	1.65D−18	1.92D−18	2.49D−18	3.48D−18	6.46D−18	1.09D−17	2.72D−17	8.08D−17
		1.84D−16	6.21D−12	9.27D−12	4.49D−16	1.54D−11	7.07D−11		6.41D−16
		8.31D−11	1.67D−11	6.52D−16	5.42D−12	5.27D−16	1.83D−12	6.76D−16	1.10D−15
		5.96D−13	1.92D−15	3.54D−16	2.19D−15	3.40D−15	1.99D−13	3.11D−15	1.91D−16
		3.46D−15	6.68D−14	3.16D−15	6.33D−17	2.41D−14	2.47D−15	1.74D−15	1.03D−15
		4.27D−17	2.54D−15	6.96D−16	6.26D−15	1.29D−15			
	0,10	8.10D−17	1.17D−16	2.26D−16	5.53D−16	1.64D−15	5.88D−15	2.61D−14	1.41D−13
		1.08D−12	1.46D−16	1.76D−16	1.34D−11	2.58D−16	4.66D−16	1.21D−15	
		4.89D−15	1.59D−14	3.27D−11	2.39D−14	5.36D−12	1.82D−14	9.58D−18	9.45D−18
		1.98D−14	1.19D−17	1.19D−12	1.50D−17	2.34D−17	1.87D−14	3.27D−17	3.05D−13
		6.05D−17	1.26D−14	4.72D−17	9.10D−14	8.52D−15	1.40D−16	6.91D−17	6.66D−17
		1.83D−14	3.60D−16	3.81D−17	3.91D−15	1.07D−16			
	1, 5	1.25D−18	1.40D−18	1.94D−18	2.98D−18	5.09D−18	1.09D−17	2.12D−17	6.28D−17
		2.55D−16	1.57D−12	2.23D−12	7.59D−16	4.28D−12	1.01D−11	5.59D−11	1.75D−15
			7.29D−11	1.52D−15	1.48D−11	1.17D−15	4.34D−12	1.28D−15	1.69D−15
		1.42D−12	2.45D−15	7.77D−16	3.07D−15	3.62D−15	4.51D−13	4.10D−15	4.14D−16
		4.40D−15	1.48D−13	4.21D−15	1.36D−16	5.34D−14	3.64D−15	2.04D−15	1.53D−15
		9.55D−17	3.92D−15	1.08D−15	1.39D−14	1.75D−15			
	1, 6	6.48D−19	7.87D−19	1.07D−18	1.80D−18	3.32D−18	7.00D−18	1.80D−17	4.27D−17
		1.50D−16	3.40D−13	4.55D−13	8.23D−16	8.67D−13	2.07D−12	6.55D−12	3.31D−15
		4.24D−11		4.60D−15	6.49D−11	2.94D−15	1.26D−11	2.30D−15	2.33D−15
		3.48D−12	3.00D−15	1.82D−15	4.27D−15	5.15D−15	1.09D−12	4.45D−15	9.30D−16
		5.89D−15	3.40D−13	5.55D−15	2.97D−16	1.19D−13	5.32D−15	2.40D−15	2.07D−15
		2.22D−16	6.25D−15	1.59D−15	3.12D−14	2.53D−15			
	0,11	7.63D−18	1.11D−17	2.19D−17	5.37D−17	1.60D−16	5.67D−16	2.42D−15	1.26D−14
		8.03D−14	3.81D−17	4.84D−17	7.20D−13	7.70D−17	1.53D−16	3.89D−16	1.03D−11
		1.34D−15	7.00D−15		3.85D−14	2.81D−11	4.71D−14	8.48D−18	8.27D−18
		3.41D−14	1.05D−17	4.46D−12	1.23D−17	2.84D−17	3.31D−14	4.72D−17	9.51D−13
		9.05D−17	2.59D−14	6.80D−17	2.57D−13	1.76D−14	1.94D−16	5.24D−17	4.92D−17
		5.03D−14	5.99D−16	2.93D−17	8.04D−15	8.15D−17			

Table 4. continued

v_f, j_f									
	1, 7	2.64D−19	3.16D−19	4.63D−19	7.78D−19	1.59D−18	3.62D−18	9.58D−18	3.01D−17
		8.85D−17	6.07D−14	8.47D−14	3.63D−16	1.52D−13	3.70D−13	1.09D−12	2.54D−15
		4.41D−12	3.32D−11	1.29D−14		8.60D−15	5.58D−11	2.46D−15	2.51D−15
		1.06D−11	2.94D−15	4.63D−15	3.64D−15	6.00D−15	2.77D−12	5.95D−15	2.18D−15
		7.00D−15	8.39D−13	7.95D−15	6.66D−16	2.77D−13	7.76D−15	2.95D−15	2.66D−15
		5.67D−16	1.01D−14	2.24D−15	7.10D−14	3.67D−15			
	0,12	6.46D−19	9.52D−19	1.90D−18	4.72D−18	1.41D−17	5.00D−17	2.09D−16	1.05D−15
		6.34D−15	7.38D−18	9.74D−18	4.72D−14	1.65D−17	3.46D−17	9.09D−17	4.91D−13
		3.01D−16	1.29D−15	8.14D−12	7.42D−15		6.41D−14	6.71D−18	7.15D−18
		9.26D−14	9.92D−18	2.44D−11	1.30D−17	3.26D−17	6.02D−14	6.07D−17	3.72D−12
		1.39D−16	4.94D−14	9.67D−17	8.14D−13	3.74D−14	2.63D−16	3.91D−17	3.43D−17
		1.47D−13	9.99D−16	2.55D−17	1.77D−14	4.33D−17			
	1, 8	8.23D−20	1.01D−19	1.49D−19	2.67D−19	5.57D−19	1.40D−18	3.97D−18	1.31D−17
		5.04D−17	9.54D−15	1.32D−14	1.85D−16	2.43D−14	5.56D−14	1.66D−13	8.79D−16
		5.86D−13	2.92D−12	7.17D−15	2.53D−11	3.37D−14		1.80D−15	1.79D−15
		4.81D−11	2.21D−15	1.32D−14	2.95D−15	5.91D−15	8.84D−12	1.04D−14	5.55D−15
		1.02D−14	2.23D−12	9.95D−15	1.59D−15	6.93D−13	1.31D−14	3.28D−15	3.18D−15
		1.63D−15	1.82D−14	2.50D−15	1.72D−13	4.72D−15			
	2, 0	4.05D−24	2.73D−24	3.64D−24	5.03D−24	1.18D−23	1.57D−23	5.76D−23	2.47D−22
		9.63D−22	3.21D−19	7.30D−19	4.03D−21	1.22D−18	9.44D−19	1.76D−18	1.32D−20
		4.93D−18	1.53D−17	3.70D−20	3.19D−17	1.01D−19	5.16D−17		6.54D−11
		6.75D−17	1.39D−11	2.16D−19	7.31D−12	2.48D−12	5.86D−17	9.57D−13	2.27D−19
		3.86D−13	1.60D−17	1.49D−13	4.09D−19	4.57D−17	5.69D−14	9.19D−15	3.64D−15
		1.22D−18	2.52D−14	1.51D−15	1.79D−16	5.82D−15			
	2, 1	6.17D−24	8.17D−24	8.56D−24	1.49D−23	3.03D−23	8.42D−23	2.66D−22	8.84D−22
		3.21D−21	1.38D−18	2.40D−18	1.15D−20	2.61D−18	4.75D−18	7.60D−18	3.48D−20
		1.74D−17	4.13D−17	9.62D−20	8.69D−17	2.87D−19	1.37D−16	1.75D−10	
		1.94D−16	9.50D−11	6.83D−19	2.10D−11	9.86D−12	1.81D−16	3.54D−12	8.36D−19
		1.34D−12	5.28D−17	5.45D−13	1.78D−18	1.68D−16	2.05D−13	2.22D−14	1.25D−14
		5.25D−18	8.97D−14	6.27D−15	6.94D−16	1.67D−14			
	1, 9	2.12D−20	2.61D−20	3.96D−20	7.27D−20	1.61D−19	4.17D−19	1.29D−18	4.46D−18
		1.81D−17	1.32D−15	1.83D−15	8.49D−17	3.37D−15	7.82D−15	2.20D−14	3.88D−16
		7.80D−14	3.28D−13	2.11D−15	1.96D−12	1.98D−14	1.95D−11	9.58D−16	1.03D−15
			1.33D−15	5.20D−14	2.00D−15	5.75D−15	4.12D−11	1.24D−14	1.48D−14
		2.15D−14	7.51D−12	1.38D−14	4.11D−15	1.90D−12	1.96D−14	3.28D−15	3.22D−15
		5.49D−15	3.70D−14	2.72D−15	4.44D−13	5.00D−15			
	2, 2	1.45D−23	1.87D−23	2.57D−23	4.39D−23	8.86D−23	2.32D−22	6.08D−22	2.05D−21
		6.18D−21	4.36D−18	3.24D−18	1.97D−20	5.51D−18	7.87D−18	1.76D−17	5.78D−20
		3.33D−17	7.02D−17	1.62D−19	1.35D−16	5.26D−19	2.22D−16	4.88D−11	1.25D−10
		3.28D−16		1.41D−18	9.73D−11	2.08D−11	3.43D−16	8.76D−12	2.06D−18
		3.28D−12	1.11D−16	1.24D−12	5.16D−18	3.87D−16	4.83D−13	4.38D−14	2.36D−14
		1.55D−17	2.06D−13	1.32D−14	1.79D−15	2.61D−14			
	0,13	5.03D−20	7.50D−20	1.52D−19	3.81D−19	1.15D−18	4.06D−18	1.69D−17	8.25D−17
		4.80D−16	1.17D−18	1.58D−18	3.36D−15	2.78D−18	6.09D−18	1.63D−17	2.89D−14
		5.31D−17	2.13D−16	3.44D−13	1.06D−15	6.51D−12	6.71D−15	3.82D−18	4.53D−18
		6.48D−14	7.08D−18		1.13D−17	2.61D−17	1.74D−13	5.44D−17	2.13D−11
		1.49D−16	9.17D−14	1.46D−16	3.24D−12	7.34D−14	5.74D−16	3.59D−17	3.32D−17
		5.00D−13	2.10D−15	3.39D−17	4.20D−14	3.35D−17			
	2, 3	6.62D−23	7.05D−23	1.00D−22	1.37D−22	2.50D−22	4.75D−22	1.18D−21	3.48D−21
		8.81D−21	5.65D−18	7.14D−18	2.75D−20	7.54D−18	1.33D−17	1.98D−17	7.20D−20
		4.12D−17	9.85D−17	1.87D−19	1.64D−16	6.82D−19	2.93D−16	2.54D−11	2.73D−11
		4.89D−16	9.61D−11	2.22D−18		9.28D−11	5.62D−16	1.94D−11	4.29D−18
		7.55D−12	2.29D−16	2.88D−12	1.39D−17	8.95D−16	1.05D−12	3.56D−14	2.94D−14
		4.38D−17	4.42D−13	3.13D−14	4.40D−15	4.26D−14			
	2, 4	8.38D−23	9.53D−23	1.24D−22	1.86D−22	3.08D−22	6.16D−22	1.30D−21	3.40D−21
		8.74D−21	7.12D−18	8.10D−18	2.64D−20	1.03D−17	1.42D−17	2.49D−17	9.09D−20
		3.94D−17	9.62D−17	3.49D−19	2.19D−16	1.38D−18	4.76D−16	6.99D−12	1.04D−11
		1.14D−15	1.67D−11	4.16D−18	7.52D−11		1.39D−15	8.69D−11	8.44D−18
		1.86D−11	6.41D−16	6.62D−12	3.37D−17	2.05D−15	2.49D−12	4.76D−14	6.05D−14
		1.20D−16	9.61D−13	4.53D−14	1.08D−14	7.99D−14			

Table 4. continued

v_f, j_f									
	1,10	4.51D−21	5.62D−21	8.67D−21	1.64D−20	3.72D−20	1.01D−19	3.18D−19	1.18D−18
		4.94D−18	1.60D−16	2.24D−16	2.42D−17	4.15D−16	9.64D−16	2.70D−15	1.35D−16
		9.09D−15	3.77D−14	7.52D−16	1.88D−13	4.74D−15	1.32D−12	3.06D−16	3.54D−16
		1.51D−11	5.08D−16	5.12D−14	8.44D−16	2.58D−15		9.80D−15	5.25D−14
		3.14D−14	3.72D−11	4.12D−14	1.31D−14	6.69D−12	2.78D−14	3.88D−15	4.14D−15
		2.11D−14	9.17D−14	3.80D−15	1.33D−12	6.58D−15			
	2, 5	3.88D−23	4.52D−23	6.01D−23	9.15D−23	1.62D−22	3.19D−22	7.37D−22	1.92D−21
		5.56D−21	4.51D−18	4.98D−18	2.08D−20	6.67D−18	9.86D−18	1.57D−17	8.78D−20
		3.08D−17	5.74D−17	4.00D−19	1.50D−16	1.78D−18	5.81D−16	1.86D−12	2.58D−12
		1.70D−15	4.84D−12	5.98D−18	1.09D−11	6.00D−11	3.65D−15		1.52D−17
		7.86D−11	1.76D−15	1.69D−11	7.78D−17	4.66D−15	5.61D−12	5.77D−14	6.75D−14
		3.12D−16	2.12D−12	8.94D−14	2.53D−14	1.91D−13			
	0,14	3.64D−21	5.49D−21	1.13D−20	2.87D−20	8.71D−20	3.09D−19	1.27D−18	6.14D−18
		3.45D−17	1.43D−19	1.98D−19	2.31D−16	3.58D−19	8.04D−19	2.17D−18	1.84D−15
		7.00D−18	2.70D−17	1.81D−14	1.24D−16	2.45D−13	6.95D−16	9.96D−19	1.37D−18
		4.57D−15	2.56D−18	5.27D−12	5.40D−18	1.31D−17	4.40D−14	3.42D−17	
		1.10D−16	2.98D−13	2.33D−16	1.94D−11	1.52D−13	1.03D−15	4.23D−17	4.90D−17
		2.24D−12	5.71D−15	5.63D−17	1.27D−13	9.72D−17			
	2, 6	3.62D−23	4.17D−23	5.64D−23	8.60D−23	1.52D−22	3.06D−22	7.10D−22	1.94D−21
		5.98D−21	2.58D−18	3.07D−18	2.27D−20	3.99D−18	6.21D−18	1.05D−17	9.75D−20
		1.99D−17	4.57D−17	4.61D−19	1.06D−16	2.44D−18	3.42D−16	4.51D−13	5.89D−13
		1.77D−15	1.09D−12	9.85D−18	2.54D−12	7.74D−12	7.04D−15	4.73D−11	2.93D−17
			7.13D−15	6.93D−11	1.74D−16	1.15D−14	1.50D−11	1.23D−13	1.39D−13
		7.89D−16	4.73D−12	1.71D−13	6.02D−14	3.52D−13			
	1,11	8.07D−22	1.01D−21	1.59D−21	3.07D−21	7.16D−21	1.99D−20	6.48D−20	2.44D−19
		1.07D−18	1.79D−17	2.51D−17	5.29D−18	4.70D−17	1.09D−16	3.03D−16	3.03D−17
		1.00D−15	3.95D−15	1.98D−16	1.90D−14	1.30D−15	1.11D−13	2.80D−17	3.46D−17
		9.24D−13	5.52D−17	9.05D−15	1.15D−16	3.98D−16	1.24D−11	1.58D−15	1.19D−13
		1.07D−14		6.87D−14	5.32D−14	3.30D−11	1.06D−13	4.57D−15	5.42D−15
		8.30D−14	2.89D−13	5.71D−15	5.01D−12	1.15D−14			
	2, 7	1.51D−23	1.76D−23	2.34D−23	3.63D−23	6.48D−23	1.34D−22	3.27D−22	9.04D−22
		2.97D−21	1.17D−18	1.35D−18	1.10D−20	1.86D−18	2.84D−18	5.10D−18	4.04D−20
		1.01D−17	2.28D−17	1.84D−19	6.40D−17	9.03D−19	1.77D−16	9.25D−14	1.27D−13
		6.03D−16	2.18D−13	5.12D−18	5.14D−13	1.46D−12	4.90D−15	5.38D−12	3.30D−17
		3.67D−11	2.44D−14		3.44D−16	3.46D−14	6.19D−11	1.89D−13	2.24D−13
		2.07D−15	1.37D−11	2.19D−13	1.49D−13	5.21D−13			
	0,15	2.49D−22	3.82D−22	8.02D−22	2.09D−21	6.48D−21	2.33D−20	9.74D−20	4.69D−19
		2.61D−18	1.06D−20	1.48D−20	1.68D−17	2.71D−20	6.14D−20	1.66D−19	1.27D−16
		5.30D−19	1.99D−18	1.13D−15	8.74D−18	1.24D−14	4.61D−17	4.14D−19	6.75D−19
		2.92D−16	1.48D−18	1.85D−13	4.04D−18	1.21D−17	2.54D−15	4.04D−17	4.47D−12
		1.51D−16	3.08D−14	5.62D−16		5.42D−13	2.32D−15	3.87D−17	5.18D−17
		1.51D−11	1.63D−14	6.52D−17	5.42D−13	1.64D−16			
	1,12	1.29D−22	1.64D−22	2.62D−22	5.20D−22	1.26D−21	3.61D−21	1.22D−20	4.78D−20
		2.14D−19	1.85D−18	2.66D−18	1.10D−18	5.08D−18	1.20D−17	3.36D−17	6.31D−18
		1.11D−16	4.25D−16	4.11D−17	1.93D−15	3.02D−16	1.06D−14	2.45D−17	3.37D−17
		7.18D−14	5.90D−17	2.22D−15	1.38D−16	3.92D−16	6.88D−13	1.29D−15	1.86D−14
		5.27D−15	1.01D−11	2.99D−14	2.88D−13		2.41D−13	3.12D−15	4.13D−15
		3.21D−13	1.10D−12	4.80D−15	2.66D−11	1.21D−14			
	2, 8	5.99D−24	6.97D−24	9.58D−24	1.55D−23	3.01D−23	7.06D−23	1.96D−22	6.66D−22
		2.55D−21	3.80D−19	4.53D−19	1.11D−20	6.26D−19	1.02D−18	1.89D−18	5.65D−20
		4.13D−18	1.04D−17	2.47D−19	2.96D−17	1.16D−18	1.10D−16	1.67D−14	2.25D−14
		4.05D−16	4.03D−14	9.51D−18	8.89D−14	2.59D−13	1.56D−15	8.46D−13	6.93D−17
		3.77D−12	1.79D−14	2.93D−11	6.72D−16	1.32D−13		1.63D−13	1.95D−13
		4.44D−15	5.51D−11	2.14D−13	3.54D−13	5.13D−13			
	3, 0	1.76D−24	1.96D−24	2.47D−24	3.48D−24	5.58D−24	1.02D−23	2.10D−23	4.99D−23
		1.27D−22	1.62D−20	1.84D−20	3.37D−22	2.10D−20	2.81D−20	4.04D−20	8.49D−22
		7.03D−20	1.42D−19	2.03D−21	3.41D−19	5.24D−21	8.37D−19	8.19D−17	7.41D−17
		2.06D−18	1.11D−16	1.81D−20	9.13D−17	1.50D−16	6.62D−18	2.64D−16	8.61D−20
		9.40D−16	2.33D−17	2.71D−15	3.41D−19	5.17D−17	4.94D−15		6.76D−11
		8.63D−19	9.13D−15	1.28D−11	9.25D−17	1.09D−11			

Table 4. continued

v_f, j_f	3, 1	7.79D−25	9.82D−25	1.54D−24	2.86D−24	6.07D−24	1.44D−23	3.71D−23	1.03D−22
		2.93D−22	9.04D−21	1.18D−20	8.37D−22	1.79D−20	3.28D−20	6.40D−20	2.19D−21
		1.41D−19	3.29D−19	5.12D−21	8.24D−19	1.23D−20	2.17D−18	8.70D−17	1.12D−16
		5.41D−18	1.60D−16	4.48D−20	2.02D−16	5.13D−16	1.90D−17	8.29D−16	2.68D−19
		2.85D−15	7.41D−17	8.63D−15	1.22D−18	1.84D−16	1.59D−14	1.81D−10	
		3.33D−18	3.17D−14	8.80D−11	3.49D−16	3.41D−11			
	0,16	1.09D−23	1.68D−23	3.55D−23	9.30D−23	2.89D−22	1.04D−21	4.37D−21	2.11D−20
		1.17D−19	1.39D−21	1.98D−21	7.53D−19	3.75D−21	8.76D−21	2.44D−20	5.56D−18
		8.10D−20	3.24D−19	4.81D−17	1.62D−18	4.87D−16	1.03D−17	2.67D−19	4.33D−19
		8.50D−17	9.68D−19	6.21D−15	2.77D−18	9.40D−18	8.88D−16	3.52D−17	1.12D−13
		1.48D−16	1.04D−14	7.35D−16	3.28D−12	1.32D−13	3.33D−15	2.13D−17	3.06D−17
			2.44D−14	4.21D−17	2.70D−12	1.24D−16			
	2, 9	4.53D−24	5.43D−24	7.82D−24	1.36D−23	2.83D−23	7.07D−23	2.08D−22	7.15D−22
		2.83D−21	1.49D−19	1.78D−19	1.25D−20	2.52D−19	4.21D−19	8.25D−19	6.20D−20
		1.89D−18	5.18D−18	3.26D−19	1.64D−17	1.88D−18	6.51D−17	3.14D−15	4.20D−15
		3.26D−16	7.31D−15	1.48D−17	1.59D−14	4.26D−14	2.19D−15	1.36D−13	1.63D−16
		5.06D−13	2.06D−14	2.77D−12	2.01D−15	2.55D−13	2.35D−11	1.28D−13	1.66D−13
		1.39D−14		2.09D−13	1.27D−12	5.34D−13			
	3, 2	4.98D−25	6.55D−25	1.06D−24	2.05D−24	4.50D−24	1.10D−23	2.93D−23	8.22D−23
		2.39D−22	5.75D−21	7.65D−21	6.59D−22	1.37D−20	2.58D−20	5.76D−20	1.67D−21
		1.32D−19	3.35D−19	4.07D−21	9.27D−19	1.22D−20	2.28D−18	4.80D−17	7.49D−17
		6.09D−18	1.20D−16	6.10D−20	2.87D−16	5.12D−16	2.32D−17	1.46D−15	4.09D−19
		4.65D−15	1.04D−16	1.13D−14	2.05D−18	2.84D−16	2.33D−14	4.59D−11	1.17D−10
		6.10D−18	5.33D−14		6.15D−16	1.34D−10			
	1,13	1.60D−23	2.05D−23	3.31D−23	6.63D−23	1.61D−22	4.64D−22	1.57D−21	6.15D−21
		2.76D−20	1.28D−19	1.86D−19	1.42D−19	3.63D−19	8.72D−19	2.48D−18	8.23D−19
		8.19D−18	3.16D−17	5.34D−18	1.41D−16	4.06D−17	7.49D−16	2.72D−17	3.97D−17
		4.77D−15	7.75D−17	3.62D−16	1.93D−16	5.85D−16	3.87D−14	1.98D−15	4.43D−15
		7.85D−15	4.37D−13	3.65D−14	8.17D−14	7.56D−12	1.84D−13	1.58D−15	2.23D−15
		1.88D−12	1.55D−12	2.95D−15		8.44D−15			
	3, 3	2.14D−24	2.56D−24	3.60D−24	5.94D−24	1.13D−23	2.45D−23	6.06D−23	1.69D−22
		5.15D−22	2.60D−20	3.02D−20	1.61D−21	4.06D−20	6.12D−20	1.07D−19	4.73D−21
		2.16D−19	5.36D−19	1.13D−20	1.52D−18	2.08D−20	4.32D−18	1.86D−16	2.00D−16
		1.12D−17	2.37D−16	6.04D−20	3.92D−16	9.06D−16	4.03D−17	3.13D−15	7.10D−19
		9.62D−15	2.10D−16	2.68D−14	5.18D−18	7.22D−16	5.59D−14	3.92D−11	4.56D−11
		1.81D−17	1.37D−13	1.34D−10	1.77D−15				

Table 5. Collision rate coefficients in cubic centimeters per second for a temperature $T = 1500$ K. xDy denotes $x \times 10^y$

v_i, j_i		0, 0	0, 1	0, 2	0, 3	0, 4	0, 5	0, 6	0, 7
		0, 8	1, 0	1, 1	0, 9	1, 2	1, 3	1, 4	0,10
		1, 5	1, 6	0,11	1, 7	0,12	1, 8	2, 0	2, 1
		1, 9	2, 2	0,13	2, 3	2, 4	1,10	2, 5	0,14
		2, 6	1,11	2, 7	0,15	1,12	2, 8	3, 0	3, 1
		0,16	2, 9	3, 2	1,13	3, 3			
v_f, j_f	0, 0		7.85D−11	1.63D−11	9.28D−12	3.55D−12	1.47D−12	6.38D−13	2.58D−13
		1.04D−13	7.18D−17	1.11D−16	4.03D−14	2.56D−16	2.86D−16	3.97D−16	1.51D−14
		5.15D−16	5.17D−16	5.50D−15	4.76D−16	1.96D−15	3.78D−16	1.07D−18	5.67D−19
		2.76D−16	7.96D−19	6.90D−16	2.50D−18	5.00D−18	1.83D−16	3.46D−18	2.37D−16
		6.52D−18	1.13D−16	5.58D−18	8.50D−17	6.40D−17	4.12D−18	7.13D−17	1.25D−17
		2.62D−17	1.20D−17	6.69D−18	4.22D−17	1.98D−17			
	0, 1	2.16D−10		1.14D−10	2.65D−11	1.33D−11	5.39D−12	2.16D−12	9.10D−13
		3.64D−13	4.27D−16	5.43D−16	1.42D−13	4.86D−16	9.10D−16	1.25D−15	5.39D−14
		1.47D−15	1.63D−15	1.98D−14	1.46D−15	7.16D−15	1.19D−15	2.74D−18	1.98D−18
		8.78D−16	2.64D−18	2.55D−15	6.81D−18	1.47D−17	5.86D−16	1.07D−17	8.86D−16
		1.97D−17	3.66D−16	1.71D−17	3.21D−16	2.08D−16	1.25D−17	2.08D−16	3.98D−17
		9.59D−17	3.72D−17	2.21D−17	1.36D−16	6.16D−17			
	0, 2	6.31D−11	1.60D−10		1.18D−10	2.75D−11	1.24D−11	5.05D−12	1.98D−12
		8.14D−13	1.16D−15	7.27D−16	3.20D−13	1.02D−15	1.32D−15	2.05D−15	1.22D−13
		2.60D−15	2.73D−15	4.58D−14	2.64D−15	1.68D−14	2.15D−15	3.66D−18	2.82D−18
		1.63D−15	5.54D−18	6.08D−15	1.28D−17	2.49D−17	1.11D−15	1.85D−17	2.15D−15
		3.45D−17	7.02D−16	2.90D−17	7.91D−16	4.08D−16	2.20D−17	3.35D−16	7.48D−17
		2.26D−16	6.62D−17	4.26D−17	2.62D−16	1.10D−16			
	0, 3	3.90D−11	4.04D−11	1.28D−10		1.14D−10	2.64D−11	1.08D−11	4.32D−12
		1.67D−12	7.12D−16	1.32D−15	6.67D−13	1.45D−15	2.12D−15	2.76D−15	2.57D−13
		3.68D−15	4.18D−15	9.68D−14	3.96D−15	3.60D−14	3.43D−15	6.09D−18	4.45D−18
		2.66D−15	7.99D−18	1.33D−14	1.71D−17	3.59D−17	1.86D−15	2.78D−17	4.76D−15
		5.02D−17	1.21D−15	4.25D−17	1.78D−15	7.19D−16	3.34D−17	4.37D−16	1.23D−16
		4.90D−16	1.03D−16	7.31D−17	4.52D−16	1.67D−16			
	0, 4	1.37D−11	1.86D−11	2.74D−11	1.05D−10		1.07D−10	2.48D−11	9.13D−12
		3.61D−12	7.68D−16	1.36D−15	1.37D−12	2.37D−15	2.85D−15	3.97D−15	5.29D−13
		4.77D−15	5.64D−15	2.01D−13	5.85D−15	7.49D−14	5.08D−15	8.58D−18	7.32D−18
		4.16D−15	1.42D−17	2.79D−14	2.47D−17	4.84D−17	3.01D−15	3.96D−17	1.01D−14
		7.00D−17	2.00D−15	5.74D−17	3.88D−15	1.24D−15	4.92D−17	5.21D−16	1.87D−16
		1.03D−15	1.54D−16	1.16D−16	7.57D−16	2.35D−16			
	0, 5	4.58D−12	6.08D−12	9.97D−12	1.95D−11	8.63D−11		9.90D−11	2.26D−11
		7.76D−12	1.44D−15	1.85D−15	2.99D−12	2.93D−15	4.21D−15	4.88D−15	1.10D−12
		6.46D−15	7.33D−15	4.15D−13	7.97D−15	1.56D−13	7.62D−15	9.35D−18	1.31D−17
		6.34D−15	2.26D−17	5.80D−14	3.24D−17	6.48D−17	4.82D−15	5.38D−17	2.13D−14
		9.27D−17	3.31D−15	7.60D−17	8.26D−15	2.13D−15	7.34D−17	5.77D−16	2.71D−16
		2.13D−15	2.29D−16	1.75D−16	1.27D−15	3.15D−16			
	0, 6	1.43D−12	1.76D−12	2.93D−12	5.74D−12	1.44D−11	7.14D−11		8.93D−11
		2.03D−11	2.67D−15	2.77D−15	6.62D−12	3.50D−15	5.22D−15	6.67D−15	2.44D−12
		7.55D−15	9.97D−15	8.83D−13	1.09D−14	3.25D−13	1.09D−14	1.57D−17	2.09D−17
		9.89D−15	3.58D−17	1.21D−13	4.95D−17	8.11D−17	7.68D−15	7.23D−17	4.44D−14
		1.27D−16	5.47D−15	1.00D−16	1.75D−14	3.69D−15	1.10D−16	6.19D−16	3.70D−16
		4.40D−15	3.40D−16	2.50D−16	2.12D−15	4.08D−16			
	0, 7	3.78D−13	4.85D−13	7.49D−13	1.51D−12	3.47D−12	1.07D−11	5.84D−11	
		8.01D−11	3.51D−15	3.77D−15	1.81D−11	4.12D−15	5.41D−15	8.57D−15	5.62D−12
		1.02D−14	1.17D−14	1.99D−12	1.55D−14	7.06D−13	1.59D−14	3.00D−17	3.42D−17
		1.50D−14	5.75D−17	2.57D−13	7.09D−17	1.09D−16	1.25D−14	9.99D−17	9.40D−14
		1.69D−16	9.09D−15	1.30D−16	3.73D−14	6.42D−15	1.74D−16	6.53D−16	4.73D−16
		9.17D−15	5.13D−16	3.29D−16	3.61D−15	5.19D−16			
	0, 8	9.10D−14	1.16D−13	1.85D−13	3.48D−13	8.21D−13	2.19D−12	7.94D−12	4.79D−11
			3.75D−15	3.82D−15	7.17D−11	4.30D−15	5.39D−15	8.50D−15	1.60D−11
		1.48D−14	1.64D−14	4.73D−12	1.90D−14	1.62D−12	2.41D−14	4.35D−17	5.15D−17
		2.35D−14	7.19D−17	5.71D−13	8.70D−17	1.28D−16	2.00D−14	1.30D−16	2.03D−13
		2.35D−16	1.54D−14	1.75D−16	8.10D−14	1.13D−14	2.68D−16	6.59D−16	5.43D−16
		1.94D−14	7.77D−16	3.92D−16	6.15D−15	6.39D−16			

Table 5. continued

v_f, j_f									
	1, 0	2.20D−18	4.76D−18	9.20D−18	5.20D−18	6.11D−18	1.42D−17	3.64D−17	7.34D−17
		1.31D−16		7.83D−11	1.80D−16	1.63D−11	9.65D−12	3.76D−12	1.96D−16
		1.62D−12	7.26D−13	1.74D−16	3.02D−13	1.31D−16	1.26D−13	1.87D−16	3.52D−16
		5.16D−14	6.65D−16	9.23D−17	7.23D−16	1.18D−15	2.05D−14	1.22D−15	5.72D−17
		1.27D−15	8.19D−15	1.28D−15	2.00D−17	3.11D−15	8.55D−16	1.87D−15	3.91D−16
		2.25D−17	1.03D−15	2.03D−16	9.40D−16	6.47D−16			
	1, 1	9.43D−18	1.67D−17	1.59D−17	2.66D−17	3.00D−17	5.04D−17	1.05D−16	2.18D−16
		3.69D−16	2.17D−10		5.29D−16	1.15D−10	2.68D−11	1.41D−11	5.98D−16
		5.86D−12	2.42D−12	5.50D−16	1.06D−12	4.27D−16	4.37D−13	1.39D−15	1.46D−15
		1.79D−13	1.24D−15	3.10D−16	2.57D−15	3.66D−15	7.20D−14	3.47D−15	1.96D−16
		3.99D−15	2.89D−14	3.84D−15	6.85D−17	1.13D−14	2.67D−15	5.59D−15	1.29D−15
		7.65D−17	3.21D−15	6.75D−16	3.41D−15	1.99D−15			
	0, 9	1.95D−14	2.50D−14	4.01D−14	7.69D−14	1.72D−13	4.66D−13	1.43D−12	5.97D−12
		3.96D−11	2.85D−15	3.02D−15		3.45D−15	4.64D−15	7.73D−15	6.47D−11
		1.54D−14	2.75D−14	1.40D−11	2.73D−14	4.00D−12	3.18D−14	6.96D−17	7.34D−17
		3.80D−14	9.30D−17	1.34D−12	1.10D−16	1.66D−16	3.35D−14	1.98D−16	4.58D−13
		3.39D−16	2.58D−14	2.33D−16	1.79D−13	2.01D−14	4.08D−16	6.16D−16	5.55D−16
		4.21D−14	1.18D−15	3.87D−16	1.07D−14	7.22D−16			
	1, 2	3.07D−17	2.12D−17	3.16D−17	4.13D−17	7.36D−17	1.13D−16	1.87D−16	3.37D−16
		5.88D−16	6.39D−11	1.62D−10	8.56D−16		1.19D−10	2.80D−11	1.04D−15
		1.34D−11	5.57D−12	1.02D−15	2.25D−12	8.36D−16	9.59D−13	3.39D−15	2.26D−15
		3.95D−13	2.70D−15	6.34D−16	3.47D−15	6.04D−15	1.59D−13	6.11D−15	4.14D−16
		6.56D−15	6.47D−14	6.73D−15	1.45D−16	2.60D−14	4.70D−15	8.13D−15	2.41D−15
		1.60D−16	5.71D−15	1.47D−15	7.88D−15	3.45D−15			
	1, 3	3.76D−17	4.35D−17	4.49D−17	6.66D−17	9.74D−17	1.78D−16	3.07D−16	4.85D−16
		8.08D−16	4.15D−11	4.16D−11	1.26D−15	1.31D−10		1.16D−10	1.61D−15
		2.75D−11	1.17D−11	1.70D−15	4.85D−12	1.48D−15	1.92D−12	2.25D−15	3.92D−15
		8.03D−13	4.40D−15	1.18D−15	6.07D−15	8.26D−15	3.24D−13	8.70D−15	7.95D−16
		9.77D−15	1.32D−13	9.53D−15	2.80D−16	5.47D−14	7.26D−15	1.02D−14	4.02D−15
		3.06D−16	8.82D−15	2.50D−15	1.66D−14	4.96D−15			
	1, 4	4.87D−17	5.55D−17	6.51D−17	8.08D−17	1.26D−16	1.93D−16	3.65D−16	7.17D−16
		1.19D−15	1.51D−11	2.04D−11	1.96D−15	2.86D−11	1.08D−10		2.63D−15
		1.11D−10	2.58D−11	2.85D−15	1.00D−11	2.60D−15	4.09D−12	2.59D−15	4.33D−15
		1.61D−12	7.46D−15	2.14D−15	8.11D−15	1.16D−14	6.47D−13	1.10D−14	1.48D−15
		1.28D−14	2.63D−13	1.30D−14	5.23D−16	1.11D−13	1.01D−14	1.08D−14	5.90D−15
		5.72D−16	1.27D−14	4.29D−15	3.37D−14	6.60D−15			
	0,10	3.74D−15	4.86D−15	7.85D−15	1.52D−14	3.41D−14	8.82D−14	2.71D−13	9.51D−13
		4.53D−12	1.59D−15	1.75D−15	3.31D−11	2.15D−15	3.03D−15	5.31D−15	
		1.21D−14	3.10D−14	5.78D−11	5.17D−14	1.22D−11	4.71D−14	9.75D−17	9.78D−17
		5.38D−14	1.18D−16	3.41D−12	1.30D−16	2.33D−16	5.69D−14	2.87D−16	1.10D−12
		4.36D−16	4.50D−14	2.98D−16	4.15D−13	3.54D−14	6.71D−16	4.99D−16	4.61D−16
		9.42D−14	1.79D−15	3.11D−16	1.86D−14	6.91D−16			
	1, 5	5.19D−17	5.38D−17	6.77D−17	8.82D−17	1.25D−16	2.09D−16	3.39D−16	7.02D−16
		1.70D−15	5.31D−12	6.97D−12	3.21D−15	1.12D−11	2.10D−11	9.10D−11	4.92D−15
			1.02D−10	5.19D−15	2.40D−11	4.74D−15	8.60D−12	4.81D−15	6.14D−15
		3.43D−12	9.17D−15	3.92D−15	1.14D−14	1.38D−14	1.31D−12	1.45D−14	2.75D−15
		1.60D−14	5.22D−13	1.62D−14	9.69D−16	2.24D−13	1.41D−14	1.18D−14	8.44D−15
		1.07D−15	1.80D−14	6.35D−15	6.73D−14	8.45D−15			
	1, 6	3.84D−17	4.39D−17	5.25D−17	7.40D−17	1.09D−16	1.75D−16	3.30D−16	5.93D−16
		1.39D−15	1.76D−12	2.12D−12	4.22D−15	3.45D−12	6.57D−12	1.56D−11	9.26D−15
		7.52D−11		1.09D−14	9.40D−11	9.34D−15	2.18D−11	9.14D−15	9.22D−15
		7.39D−12	1.16D−14	7.50D−15	1.50D−14	1.94D−14	2.82D−12	1.70D−14	5.16D−15
		2.06D−14	1.06D−12	2.01D−14	1.81D−15	4.53D−13	1.94D−14	1.25D−14	1.04D−14
		2.07D−15	2.59D−14	9.13D−15	1.35D−13	1.17D−14			
	0,11	6.54D−16	8.56D−16	1.41D−15	2.74D−15	6.19D−15	1.59D−14	4.68D−14	1.61D−13
		6.41D−13	6.76D−16	7.72D−16	3.43D−12	1.01D−15	1.53D−15	2.76D−15	2.77D−11
		6.13D−15	1.75D−14		6.04D−14	5.18D−11	9.44D−14	1.30D−16	1.29D−16
		8.00D−14	1.51D−16	1.07D−11	1.57D−16	3.11D−16	8.70D−14	3.92D−16	2.88D−12
		5.94D−16	7.96D−14	4.22D−16	1.01D−12	6.33D−14	8.28D−16	3.69D−16	3.19D−16
		2.23D−13	2.59D−15	2.16D−16	3.27D−14	5.00D−16			

Table 5. continued

v_f, j_f									
	1, 7	2.37D−17	2.65D−17	3.40D−17	4.70D−17	7.55D−17	1.28D−16	2.41D−16	5.25D−16
		1.08D−15	4.91D−13	6.22D−13	2.81D−15	9.35D−13	1.83D−12	4.08D−12	1.04D−14
		1.19D−11	6.30D−11	2.53D−14		2.03D−14	8.48D−11	1.11D−14	1.15D−14
		1.96D−11	1.26D−14	1.51D−14	1.38D−14	2.02D−14	6.25D−12	2.13D−14	9.92D−15
		2.67D−14	2.31D−12	2.67D−14	3.41D−15	9.42D−13	2.60D−14	1.44D−14	1.28D−14
		4.32D−15	3.76D−14	1.21D−14	2.74D−13	1.62D−14			
	0,12	1.05D−16	1.39D−16	2.32D−16	4.58D−16	1.04D−15	2.68D−15	7.76D−15	2.58D−14
		9.89D−14	2.28D−16	2.70D−16	4.42D−13	3.73D−16	6.02D−16	1.13D−15	2.63D−12
		2.52D−15	6.73D−15	2.33D−11	2.18D−14		9.50D−14	1.57D−16	1.63D−16
		1.69D−13	1.97D−16	4.68D−11	2.23D−16	3.97D−16	1.34D−13	5.12D−16	9.31D−12
		8.11D−16	1.28D−13	4.95D−16	2.69D−12	1.14D−13	1.03D−15	3.03D−16	2.32D−16
		5.57D−13	3.76D−15	1.88D−16	6.16D−14	2.74D−16			
	1, 8	1.16D−17	1.32D−17	1.70D−17	2.50D−17	4.04D−17	7.51D−17	1.48D−16	3.32D−16
		8.40D−16	1.26D−13	1.58D−13	2.01D−15	2.45D−13	4.47D−13	1.02D−12	5.81D−15
		2.62D−12	8.99D−12	2.43D−14	5.22D−11	5.45D−14		9.84D−15	9.65D−15
		7.66D−11	1.11D−14	3.26D−14	1.20D−14	2.02D−14	1.72D−11	3.16D−14	1.99D−14
		3.46D−14	5.31D−12	3.30D−14	6.71D−15	2.08D−12	4.19D−14	1.51D−14	1.39D−14
		1.02D−14	6.08D−14	1.25D−14	5.90D−13	1.97D−14			
	2, 0	1.20D−21	1.11D−21	1.05D−21	1.62D−21	2.48D−21	3.36D−21	7.78D−21	2.28D−20
		5.52D−20	6.78D−18	1.83D−17	1.60D−19	3.15D−17	1.91D−17	2.35D−17	4.38D−19
		5.32D−17	1.37D−16	1.22D−18	2.48D−16	3.27D−18	3.58D−16		7.79D−11
		4.84D−16	1.64D−11	5.66D−18	1.01D−11	3.93D−12	4.29D−16	1.72D−12	5.16D−18
		8.13D−13	7.35D−17	3.73D−13	7.04D−18	2.90D−16	1.61D−13	4.04D−14	1.42D−14
		1.84D−17	8.77D−14	6.73D−15	1.20D−15	1.89D−14			
	2, 1	1.76D−21	2.22D−21	2.25D−21	3.28D−21	5.87D−21	1.30D−20	2.89D−20	7.21D−20
		1.82D−19	3.55D−17	5.35D−17	4.68D−19	5.82D−17	9.20D−17	1.09D−16	1.22D−18
		1.88D−16	3.84D−16	3.35D−18	7.12D−16	9.41D−18	9.74D−16	2.16D−10	
		1.37D−15	1.15D−10	1.74D−17	2.72D−11	1.48D−11	1.29D−15	6.17D−12	1.77D−17
		2.68D−12	2.26D−16	1.30D−12	2.80D−17	1.02D−15	5.53D−13	9.55D−14	4.82D−14
		7.36D−17	2.98D−13	2.66D−14	4.32D−15	5.39D−14			
	1, 9	4.83D−18	5.57D−18	7.34D−18	1.10D−17	1.88D−17	3.56D−17	7.70D−17	1.78D−16
		4.68D−16	2.94D−14	3.70D−14	1.37D−15	5.74D−14	1.06D−13	2.28D−13	3.78D−15
		5.94D−13	1.74D−12	1.17D−14	6.85D−12	5.51D−14	4.36D−11	7.57D−15	7.75D−15
			8.68D−15	8.39D−14	1.01D−14	1.92D−14	6.83D−11	3.24D−14	4.07D−14
		5.33D−14	1.53D−11	4.50D−14	1.36D−14	4.89D−12	6.27D−14	1.48D−14	1.33D−14
		2.83D−14	1.11D−13	1.25D−14	1.34D−12	1.89D−14			
	2, 2	3.51D−21	4.23D−21	6.31D−21	8.39D−21	1.62D−20	3.20D−20	7.04D−20	1.73D−19
		3.61D−19	9.57D−17	6.44D−17	8.47D−19	9.94D−17	1.47D−16	2.68D−16	2.10D−18
		4.01D−16	6.89D−16	5.62D−18	1.12D−15	1.63D−17	1.59D−15	6.48D−11	1.64D−10
		2.19D−15		3.25D−17	1.21D−10	2.86D−11	2.25D−15	1.40D−11	3.86D−17
		6.09D−12	4.20D−16	2.68D−12	7.25D−17	2.16D−15	1.21D−12	1.76D−13	8.67D−14
		1.94D−16	6.37D−13	5.37D−14	1.00D−14	8.20D−14			
	0,13	1.57D−17	2.11D−17	3.57D−17	7.17D−17	1.65D−16	4.24D−16	1.23D−15	3.99D−15
		1.48D−14	6.84D−17	8.30D−17	6.29D−14	1.20D−16	2.03D−16	3.96D−16	3.12D−13
		8.84D−16	2.29D−15	2.05D−12	6.88D−15	1.99D−11	2.42D−14	1.15D−16	1.28D−16
		1.09D−13	1.68D−16		2.20D−16	3.67D−16	2.86D−13	5.38D−16	4.20D−11
		9.42D−16	1.97D−13	7.66D−16	8.70D−12	1.81D−13	2.43D−15	3.49D−16	2.84D−16
		1.60D−12	6.71D−15	2.90D−16	1.26D−13	2.44D−16			
	2, 3	1.22D−20	1.21D−20	1.62D−20	1.99D−20	3.13D−20	5.10D−20	1.08D−19	2.37D−19
		4.85D−19	1.15D−16	1.48D−16	1.11D−18	1.42D−16	2.26D−16	3.23D−16	2.55D−18
		5.54D−16	9.89D−16	6.44D−18	1.35D−15	2.04D−17	1.92D−15	4.43D−11	4.31D−11
		2.82D−15	1.34D−10	4.74D−17		1.18D−10	3.24D−15	2.78D−11	7.17D−17
		1.27D−11	7.53D−16	5.71D−12	1.76D−16	4.63D−15	2.39D−12	1.35D−13	1.12D−13
		4.91D−16	1.25D−12	1.18D−13	2.21D−14	1.27D−13			
	2, 4	2.32D−20	2.46D−20	2.98D−20	3.95D−20	5.80D−20	9.64D−20	1.67D−19	3.43D−19
		6.77D−19	1.78D−16	2.00D−16	1.58D−18	2.33D−16	2.90D−16	4.37D−16	4.35D−18
		6.33D−16	1.21D−15	1.21D−17	1.88D−15	3.44D−17	3.05D−15	1.63D−11	2.21D−11
		5.10D−15	3.00D−11	7.47D−17	1.12D−10		6.23D−15	1.15D−10	1.23D−16
		2.78D−11	1.81D−15	1.18D−11	3.85D−16	9.76D−15	5.19D−12	1.71D−13	2.13D−13
		1.21D−15	2.49D−12	1.74D−13	4.91D−14	2.33D−13			

Table 5. continued

v_f, j_f									
	1,10	1.70D−18	1.97D−18	2.66D−18	4.10D−18	7.23D−18	1.44D−17	3.17D−17	7.89D−17
		2.11D−16	6.18D−15	7.87D−15	6.40D−16	1.23D−14	2.28D−14	4.88D−14	2.12D−15
		1.20D−13	3.51D−13	6.77D−15	1.16D−12	2.33D−14	5.20D−12	3.57D−15	3.85D−15
		3.62D−11	4.73D−15	1.16D−13	6.14D−15	1.25D−14		2.42D−14	1.03D−13
		5.80D−14	6.35D−11	9.48D−14	3.39D−14	1.45D−11	7.52D−14	1.92D−14	1.86D−14
		9.18D−14	2.51D−13	1.82D−14	3.49D−12	2.41D−14			
	2, 5	1.34D−20	1.51D−20	1.85D−20	2.55D−20	3.97D−20	6.69D−20	1.25D−19	2.63D−19
		5.71D−19	1.54D−16	1.58D−16	1.58D−18	1.97D−16	2.55D−16	3.48D−16	4.47D−18
		5.56D−16	8.84D−16	1.27D−17	1.65D−15	3.70D−17	3.99D−15	5.95D−12	7.71D−12
		7.17D−15	1.23D−11	9.15D−17	2.19D−11	9.59D−11	1.01D−14		2.01D−16
		1.08D−10	4.25D−15	2.65D−11	8.11D−16	2.04D−14	1.05D−11	1.98D−13	2.21D−13
		2.75D−15	4.95D−12	3.21D−13	1.04D−13	5.43D−13			
	0.14	2.17D−18	2.95D−18	5.09D−18	1.04D−17	2.41D−17	6.27D−17	1.82D−16	5.88D−16
		2.12D−15	1.71D−17	2.12D−17	8.67D−15	3.16D−17	5.53D−17	1.10D−16	4.05D−14
		2.50D−16	6.37D−16	2.22D−13	1.83D−15	1.60D−12	5.96D−15	4.24D−17	5.23D−17
		2.13D−14	8.01D−17	1.70D−11	1.34D−16	2.44D−16	1.02D−13	4.78D−16	
		1.06D−15	4.37D−13	1.71D−15	3.97D−11	2.92D−13	5.16D−15	5.44D−16	5.55D−16
		5.89D−12	1.70D−14	6.10D−16	3.41D−13	7.39D−16			
	2, 6	1.90D−20	2.09D−20	2.60D−20	3.48D−20	5.28D−20	8.68D−20	1.65D−19	3.36D−19
		7.79D−19	1.21D−16	1.37D−16	2.04D−18	1.59D−16	2.16D−16	3.03D−16	5.11D−18
		4.62D−16	8.06D−16	1.45D−17	1.56D−15	4.41D−17	3.28D−15	2.12D−12	2.52D−12
		8.88D−15	4.02D−12	1.21D−16	7.55D−12	1.75D−11	1.82D−14	8.10D−11	3.36D−16
			1.36D−14	9.85D−11	1.64D−15	4.47D−14	2.47D−11	3.94D−13	4.21D−13
		6.06D−15	9.93D−12	5.52D−13	2.21D−13	9.72D−13			
	1,11	5.22D−19	6.12D−19	8.34D−19	1.32D−18	2.39D−18	4.90D−18	1.12D−17	2.85D−17
		8.06D−17	1.23D−15	1.57D−15	2.45D−16	2.48D−15	4.60D−15	9.86D−15	8.34D−16
		2.39D−14	6.60D−14	3.08D−15	2.14D−13	1.10D−14	7.97D−13	3.03D−16	3.36D−16
		4.04D−12	4.38D−16	4.00D−14	7.08D−16	1.80D−15	3.16D−11	5.05D−15	2.19D−13
		2.16D−14		1.01D−13	1.07D−13	5.87D−11	2.26D−13	2.75D−14	2.94D−14
		3.07D−13	6.95D−13	3.10D−14	1.12D−11	4.63D−14			
	2, 7	1.12D−20	1.24D−20	1.50D−20	2.02D−20	2.97D−20	4.89D−20	8.93D−20	1.77D−19
		3.98D−19	8.34D−17	9.07D−17	9.63D−19	1.12D−16	1.45D−16	2.12D−16	2.40D−18
		3.22D−16	5.42D−16	7.09D−18	1.07D−15	1.85D−17	2.16D−15	6.69D−13	8.37D−13
		5.16D−15	1.22D−12	6.74D−17	2.33D−12	5.08D−12	2.05D−14	1.37D−11	3.73D−16
		6.77D−11	4.39D−14		2.95D−15	1.04D−13	9.14D−11	5.89D−13	6.34D−13
		1.33D−14	2.53D−11	6.78D−13	4.76D−13	1.32D−12			
	0,15	3.00D−19	4.12D−19	7.21D−19	1.50D−18	3.55D−18	9.38D−18	2.76D−17	8.98D−17
		3.25D−16	2.30D−18	2.85D−18	1.31D−15	4.27D−18	7.50D−18	1.50D−17	5.90D−15
		3.40D−17	8.61D−17	3.01D−14	2.42D−16	1.78D−13	7.73D−16	2.23D−17	3.20D−17
		2.75D−15	5.80D−17	1.35D−12	1.27D−16	2.94D−16	1.29D−14	7.41D−16	1.53D−11
		1.99D−15	8.18D−14	5.21D−15		7.20D−13	1.44D−14	7.09D−16	8.35D−16
		3.12D−11	5.35D−14	9.74D−16	1.29D−12	1.59D−15			
	1,12	1.38D−19	1.63D−19	2.27D−19	3.69D−19	6.92D−19	1.47D−18	3.54D−18	9.43D−18
		2.76D−17	2.19D−16	2.86D−16	8.93D−17	4.66D−16	8.95D−16	1.95D−15	3.07D−16
		4.80D−15	1.31D−14	1.15D−15	4.08D−14	4.61D−15	1.46D−13	5.60D−16	7.07D−16
		6.04D−13	1.05D−15	1.72D−14	2.04D−15	4.54D−15	3.38D−12	1.14D−14	6.87D−14
		3.30D−14	2.75D−11	1.12D−13	4.40D−13		4.89D−13	2.25D−14	2.64D−14
		9.90D−13	2.09D−12	2.92D−14	4.89D−11	5.16D−14			
	2, 8	5.21D−21	5.76D−21	7.20D−21	1.01D−20	1.61D−20	2.99D−20	6.18D−20	1.50D−19
		3.87D−19	3.53D−17	3.99D−17	1.07D−18	4.96D−17	6.98D−17	1.04D−16	3.42D−18
		1.77D−16	3.30D−16	8.81D−18	6.60D−16	2.44D−17	1.73D−15	1.83D−13	2.26D−13
		4.55D−15	3.47D−13	1.35D−16	6.19D−13	1.42D−12	1.03D−14	3.42D−12	7.12D−16
		1.07D−11	6.22D−14	5.79D−11	5.18D−15	2.87D−13		5.42D−13	5.95D−13
		2.46D−14	8.75D−11	6.65D−13	9.92D−13	1.21D−12			
	3, 0	3.42D−21	3.62D−21	4.14D−21	4.98D−21	6.47D−21	8.90D−21	1.32D−20	2.13D−20
		3.60D−20	2.92D−18	3.16D−18	6.09D−20	3.25D−18	3.71D−18	4.20D−18	9.63D−20
		5.61D−18	8.07D−18	1.49D−19	1.38D−17	2.72D−19	2.37D−17	1.74D−15	1.48D−15
		4.06D−17	1.92D−15	7.36D−19	1.32D−15	1.77D−15	9.93D−17	2.45D−15	2.84D−18
		6.49D−15	2.87D−16	1.41D−14	9.63D−18	5.01D−16	2.05D−14		8.20D−11
		2.47D−17	3.82D−14	1.51D−11	9.08D−16	1.56D−11			

Table 5. continued

v_f, j_f									
	3, 1	1.66D−21	1.93D−21	2.58D−21	3.89D−21	6.48D−21	1.16D−20	2.20D−20	4.30D−20
		8.26D−20	1.70D−18	2.02D−18	1.53D−19	2.68D−18	4.07D−18	6.41D−18	2.47D−19
		1.12D−17	1.88D−17	3.58D−19	3.42D−17	5.79D−19	6.07D−17	1.69D−15	2.08D−15
		1.02D−16	2.62D−15	1.67D−18	3.06D−15	6.14D−15	2.67D−16	7.63D−15	8.08D−18
		1.93D−14	8.51D−16	4.23D−14	3.16D−17	1.64D−15	6.27D−14	2.28D−10	
		8.58D−17	1.25D−13	1.06D−10	3.13D−15	4.78D−11			
	0,16	3.41D−20	4.54D−20	7.61D−20	1.52D−19	3.47D−19	8.92D−19	2.56D−18	8.15D−18
		2.88D−17	9.58D−19	1.17D−18	1.13D−16	1.74D−18	3.03D−18	6.07D−18	4.94D−16
		1.39D−17	3.64D−17	2.44D−15	1.13D−16	1.36D−14	4.32D−16	2.15D−17	3.10D−17
		2.11D−15	5.73D−17	9.16D−14	1.31D−16	3.40D−16	1.29D−14	9.26D−16	8.37D−13
		2.71D−15	8.70D−14	8.68D−15	1.15D−11	5.99D−13	2.53D−14	6.71D−16	8.38D−16
			1.03D−13	1.03D−15	5.34D−12	1.86D−15			
	2, 9	8.95D−21	1.00D−20	1.27D−20	1.82D−20	2.97D−20	5.47D−20	1.13D−19	2.60D−19
		6.58D−19	2.50D−17	2.82D−17	1.81D−18	3.54D−17	4.98D−17	7.71D−17	5.37D−18
		1.33D−16	2.60D−16	1.62D−17	5.62D−16	5.22D−17	1.48D−15	5.84D−14	7.16D−14
		4.72D−15	1.07D−13	2.19D−16	1.89D−13	3.99D−13	2.01D−14	9.53D−13	1.38D−15
		2.54D−12	1.12D−13	9.41D−12	1.13D−14	7.20D−13	5.14D−11	5.93D−13	6.98D−13
		5.89D−14		8.27D−13	2.66D−12	1.55D−12			
	3, 2	1.28D−21	1.54D−21	2.11D−21	3.33D−21	5.75D−21	1.08D−20	2.14D−20	4.30D−20
		8.57D−20	1.27D−18	1.53D−18	1.53D−19	2.35D−18	3.64D−18	6.70D−18	2.40D−19
		1.21D−17	2.35D−17	3.49D−19	4.66D−17	6.73D−19	7.80D−17	1.16D−15	1.64D−15
		1.37D−16	2.33D−15	2.44D−18	4.61D−15	7.21D−15	3.76D−16	1.59D−14	1.28D−17
		3.64D−14	1.29D−15	6.50D−14	5.28D−17	2.60D−15	1.01D−13	6.03D−11	1.53D−10
		1.51D−16	2.13D−13		5.34D−15	1.75D−10			
	1,13	4.03D−20	4.72D−20	6.47D−20	1.03D−19	1.87D−19	3.89D−19	9.04D−19	2.35D−18
		6.69D−18	2.93D−17	3.84D−17	2.10D−17	6.27D−17	1.20D−16	2.62D−16	7.14D−17
		6.38D−16	1.74D−15	2.63D−16	5.26D−15	1.10D−15	1.84D−14	1.02D−15	1.33D−15
		7.33D−14	2.16D−15	5.28D−15	4.31D−15	1.01D−14	3.60D−13	2.56D−14	3.55D−14
		7.24D−14	2.33D−12	2.27D−13	3.50D−13	2.17D−11	7.49D−13	1.81D−14	2.24D−14
		3.91D−12	3.42D−12	2.66D−14		5.18D−14			
	3, 3	4.26D−21	4.81D−21	6.08D−21	8.53D−21	1.31D−20	2.18D−20	3.91D−20	7.59D−20
		1.56D−19	4.54D−18	5.05D−18	3.20D−19	6.17D−18	8.08D−18	1.15D−17	5.98D−19
		1.80D−17	3.38D−17	9.04D−19	6.97D−17	1.10D−18	1.38D−16	3.65D−15	3.74D−15
		2.32D−16	3.99D−15	2.31D−18	5.58D−15	1.08D−14	5.59D−16	3.02D−14	1.73D−17
		7.18D−14	2.16D−15	1.42D−13	9.66D−17	5.15D−15	2.05D−13	7.00D−11	7.71D−11
		3.07D−16	4.47D−13	1.96D−10	1.17D−14				