Errata for Mechanics and Symmetry, 2nd Edition, January, 2003 Printing

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This file contains the errata known to us as of November, 2007 for the January, 2003 printing of the 2nd edition (2003). We especially thank Clancy Rowley and Naomi Leonard and their class at Princeton University for finding many of the new errata.

If you have an earlier printing please see the book's web sites for the earlier errata list: http://www.cds.caltech.edu/marsden/books/ (and click on *Mechanics and Symmetry*).

Chapter 1

Page 23. Last displayed equation should read

$$\mathbf{j}_f(\mathbf{x},t) = e\int \mathbf{v} f(\mathbf{x},\mathbf{v},t)d^3v$$

Page 24. First displayed equation should read

$$\rho_f(\mathbf{x},t) = e\int f(\mathbf{x},\mathbf{v},t)d^3v$$

Page 26. Equation (1.6.11) should read

$$H(f) = \frac{1}{2}\int \|\mathbf{v}\|^2 f(\mathbf{x},\mathbf{v},t)d^3x d^3v + \frac{1}{2m}\int \|\nabla\varphi(\mathbf{x},t)\|^2 d^3x$$

Page 40, line 10. "Lie algebra" should be "dual of the Lie algebra"

Page 42. In Exercise 1.7-2, S^{ij} should be S_{ij}

Chapter 2

Page 72. In item (2) below equation (2.3.14), the last term in the equation, namely A_{pq}, should be A_{qp}

Chapter 4

Page 130. In the footnote, add Arnold [1989] to the list that follows the same conventions as we do.

Chapter 5

Page 157. In the last line, p^i in the second equation should be p_i

Page 158. In equation (1.5.2), $\frac{d}{dt}(H\varphi_t(z))$ should read $\frac{d}{dt}H(\varphi_t(z))$

Page 159. On lines 3 and 9, P should be P_1

Chapter 6

Page 172. In lines 1 and 3, $\varphi \circ \pi_S$ should read $\varphi|_S \circ \pi_S$

Page 179. The line above equation (6.7.4) should read Letting the components of the Hamiltonian vector field X_H be denoted by $(u, v, w, \dot{u}, \dot{v}, \dot{w})$, the condition

Chapter 7

Page 194. On line 2 from the bottom, replace "geodesic" with "base integral curve"

Page 207-208 The text around equations (7.8.8) and (7.8.9) should read as follows:

Letting $X(q, v) = (v, X_2(q, v))$, equations (7.2.8), (7.3.2) and (7.8.3) imply

$$\begin{aligned}&\Phi_L(X)(q,v)\cdot(u,w)\\&\quad= -\mathbf{D}_1\left(\mathbf{D}_2L(q,v)\cdot u\right)\cdot v - \mathbf{D}_2\mathbf{D}_2L(u,e)\cdot u\cdot X_2(q,v) + \mathbf{D}_1L(q,v)\cdot u. \quad (7.8.8)\end{aligned}$$

Thus, taking into account the symmetry of $\mathbf{D}_2\mathbf{D}_2L(u, e)$, the local Lagrange-d'Alembert principle is equivalent to the identity

$$\begin{aligned}&-\mathbf{D}_1\left(\mathbf{D}_2L(q,v)\cdot u\right)\cdot v - \mathbf{D}_2\mathbf{D}_2L(u,e)\cdot X_2(q,v)\cdot u + \mathbf{D}_1L(q,v)\cdot u\\&\qquad + \mathbf{D}_2\mathbf{D}_2L(u,e)\cdot Y_2(q,v)\cdot u = 0 \quad (7.8.9)\end{aligned}$$

for any $u \in E$ (the model space for Q). Setting $v = dq/dt$ and $X_2(q, v) = dv/dt = d^2q/dt^2$, the preceding relation and the chain rule give

$$\frac{d}{dt}\mathbf{D}_2L(q,v) - \mathbf{D}_1L(q,v) = \mathbf{D}_2\mathbf{D}_2L(q,v)\cdot Y_2(q,v), \quad (0.1)$$

Chapter 8

Page 251. The second paragraph has a mispelling: "Ficticious Forces" should be "Fictitious Forces".

Chapter 9

Page 275. The second display in item 2 should read

$$\mathrm{Ad}_g\ \eta = T_gR_{g^{-1}}\cdot T_eL_g\cdot\eta = T_{g^{-1}}L_g\cdot T_eR_{g^{-1}}\cdot\eta.$$

and in figure 9.1.3, the label $T_gR_g^{-1}$ should be $T_gR_{g^{-1}}$

Page 281. The second sentence in the Proof at the top of the page has two mispellings: invariant and equaling

Page 293. In the second displayed equation, the middle $(\det A\mathbb{J})$ should be $(\det \mathbb{J})$

Page 295. In the statement of Lemma 9.2.12, n should be $2n$

Page 299. Insert parentheses in line 12 from the bottom: $\frac{1}{2}\langle\delta z, Bz\rangle + \langle z, B\delta z\rangle$ should be $\frac{1}{2}\left(\langle\delta z, Bz\rangle + \langle z, B\delta z\rangle\right)$

Page 301. In the first displayed equation, the lower index of the sum should be $i = 1$.

Page 303. In the middle of page, the equation $(T_e\pi(\tilde{\alpha})x)\cdot\sigma = ...$, in the third line both $\tilde{\alpha}$'s should just be α (with no tilde).

Page 306. In the lower left (3,1) entry of the matrix in equation (9.2.17), a_v^1 and a_v^2 should be swapped and the (3,3) entry should be equal to $2a_s^2 + 2(a_v^3)^2 - 1$ instead of $2a_s^2 + (a_v^3)^2 - 1$

Page 324. In Theorem 9.3.10, there should be a space between "Let" and "$\mathfrak{g}$"

Chapter 12

Page 405. In the second line from the bottom, "by Proposition 2.7.1" should be "by Proposition 2.5.1"

Chapter 13

Page 418. In formula (13.1.1), replace $\pm$ with $\mp$ in both places

Page 419. "(see (12.2.8)" is missing a right parenthesis

Chapter 14

Page 471. The α's in the first paragraph on this page should be boldface.

Page 471. The displayed formula following (14.6.18) should read as follows:

$$\begin{aligned} dA(\mu,\boldsymbol{\alpha})((-\mathbb{J}\boldsymbol{\alpha}\cdot\mathbf{u},\xi\mathbb{J}\boldsymbol{\alpha}),\,(-\mathbb{J}\boldsymbol{\alpha}\cdot\mathbf{v},\eta\mathbb{J}\boldsymbol{\alpha})) \\ &= \frac{(0,\boldsymbol{\alpha})}{\|\boldsymbol{\alpha}\|}\cdot[(-\mathbb{J}\boldsymbol{\alpha}\cdot\mathbf{u},\xi\mathbb{J}\boldsymbol{\alpha})\times(-\mathbb{J}\boldsymbol{\alpha}\cdot\mathbf{v},\eta\mathbb{J}\boldsymbol{\alpha})] \\ &= \|\boldsymbol{\alpha}\|(\xi\mathbb{J}\boldsymbol{\alpha}\cdot\mathbf{v} - \eta\mathbb{J}\boldsymbol{\alpha}\cdot\mathbf{u}). \end{aligned}$$

(In the text, in the second line, in the second factor of the cross product the $\mathbf{u}$ should be a $\mathbf{v}$ and the ξ should be a η. There is also an extra parenthesis in the second line of the displayed formula.)

Chapter 15

Page 498. In formula (15.7.3), In the expression for p_φ, in the parenthesis immediately following I_2, replace $\cos\varphi$ by $\cos\psi$.