[J] T. JECH, *A game theoretic property of Boolean algebras*, **Logic Colloquium** *'77* (A. Macintyre, L. Pacholski and J. Paris, editors), North-Holland, Amsterdam, 1978, pp. 135–144.

[V1] P. VOJTÁŠ, *A transfinite Boolean game and a generalization of Kripke's embedding theorem*, ***General topology and its relations to modern analysis and algebra. V (Proceedings of the Fifth Prague Symposium, 1981)***, Heldermann Verlag, Berlin, 1982, pp. 663–668.

[V2] ———, *Game properties of Boolean algebras*, ***Commentationes Mathematicae Universitatis Carolinae***, vol. 24 (1983), pp. 349–369.

VOLKER WEISPFENNING, *Quantifier elimination for distributive lattices.*

Let $L = \{\sqcap, \sqcup\}$ be the language of lattices and let L_C be L together with an arbitrary set C of constant-symbols. We characterize all classes K of distributive lattices in L_C that allow quantifier elimination (q.e.) in L_C. Any such K allows primitive recursive q.e. in L_C; moreover for finite C, K is primitive recursively decidable. The number of different complete, elementary classes K allowing q.e. in L_C is finite for finite C, but rapidly growing with card C. Let $q(n)$ $(q'(n))$ be the number of complete, elementary classes K of (relatively complemented) distributive lattices in L_C allowing q.e. in L_C, where C is fixed as a chain of length n. Then $q'(0) = 2$, $q'(n) = 3^{n+1}$ for $n \geq 1$; $q(0) = 3$, $q(1) = 41$, $q(n) > 2^{4n-5} \cdot 3^4$ for $n \geq 2$. As a corollary, we have a complete list of all classes of boolean algebras and relatively complemented, distributive lattices that allow q.e. in their respective languages with an arbitrary set of additional constants.

EDUARD W. WETTE, 1977 *Wrocław abstract renewed: Computation of the anisotropic proportions in an anti-Einsteinian representation of all motions. II.*

For the complete title cf. XLIV, p. 476, [12]; pp. 441–468 contained $64 = 37 + 8 - 1 - 2 + 22$ abstracts. (ii), (iii), (vi) refer to §2; see Part I later on.

§2$^{>}$. Hypertorus recursion. $^{>}$ indicates that, as concerns *numerical* determination (and the *direction* of geodesics' projection), ν will precede $\nu - 1$ in ϱ_ν (and β_ν), vs. hypertorus-generation.

(ii) $r_0 : \ldots : r_n$ determines $\mathfrak{T}$ $(= (n+1)$-torus). "∞" $\leftrightarrows$ self-intersection; $\neg$ "∞" $\rightarrow \sum_{\mu<\nu} r_\mu < r_\nu$ $[\leftrightarrow \varrho_{\nu-1} < \varrho_\nu/(2 - \varrho_\nu)]$, $\nu = 0 \ldots n$; $(r_0 + \ldots + r_\nu) : r_n = (1 - \varrho_{n-1})\varrho_\nu/(1 - \varrho_\nu)$, $\nu = n \ldots -1$, solves $\varrho_\nu = (r_0 + \ldots + r_\nu) : (r_n - r_{n-1} - \ldots - r_{\nu+1}) \wedge \varrho_n = (1 + \varrho_{n-1})/2 \wedge \varrho_{-1} = 0, n > \nu \geq 0$. $\mathfrak{T}$ embedded: ${}^{n+1}x_\nu = {}^{\nu+1}x_\nu = P_\nu \sin\beta_\nu (\nu \leq n)$, ${}^{n+1}x_{n+1} = P_n \cos\beta_n$; $P_l = \sum_{m \leq l} r_m \Pi^l_m$, $\Pi^l_m = \prod_{m}^{l-1}{}_{\mu} \cos\beta_\mu$. $r = P_n/r_n$, cosmic 'time' $t_r = r\beta_n$; $n - 3 = 0$ results from §2 (v). $\sum_{j \leq k+1} (\mathrm{d}({}^{k+1}x_j))^2 = \sum_{j \leq k} P_j^2 (\mathrm{d}\beta_j)^2 = (\mathrm{d}s_k)^2$.

(iii) Components $\neq 0$: $g_{kk} = P_k^2$ $(0 \leq k \leq n)$; $\Gamma_{j \cdot kk} = P_j P_k \sin\beta_j \cdot \Pi^k_{j+1} = -\Gamma_{k \cdot jk} = -\Gamma_{k \cdot kj}$, $R_{jkjk} = P_j P_k \cdot \Pi^j_0 \Pi^k_0 = -R_{jkkj} = R_{kjkj} = -R_{kjjk} (0 \leq j < k \leq n)$; $R_{jkjk;l} = \sin\beta_l \cdot \Pi^j_0 \Pi^k_0 (P_l(P_j \Pi^k_{l+1} + (1 - 0^{\dot{-}l}) \cdot P_k \Pi^j_{l+1}) - (2 - 0^{j \dot{-} l}) P_j P_k / \cos\beta_l) = -R_{jkkj;l} = R_{kjkj;l} = -R_{kjjk;l} (l < k \wedge j < k, 0 < k \leq n)$; $R_{jkjl:kl} = P_j \Pi^j_0 \Pi^k_0 \Pi^l_0 (P_k \Pi^l_0 - P_l \Pi^k_0) = -R_{jkjl:lk} = -R_{jklj:kl} = R_{jklj:lk} = R_{kjlj:kl} = -R_{kjlj:lk} = -R_{kjjl:kl} = R_{kjjl:lk} [= -R_{jljk:lk} = \ldots$ skew-symmetric in $k, l]$ $(j \neq k \wedge j \neq l \wedge k \neq l, g^{jk} = \delta_{jk}/g_{kk})$, curvature's curvature

$$R^j_{klm:pq} = R^\nu_{klm} R^j_{\nu pq} - R^j_{\nu lm} R^\nu_{kpq} - R^j_{k\nu m} R^\nu_{lpq} - R^j_{kl\nu} R^\nu_{mpq} \leftrightarrow \underset{43}{\Delta}\, \underset{21}{\Delta}\, \xi^j + R^j_{\nu\varrho\sigma} \underset{21}{\Delta}\, \xi^\nu \underset{3}{\mathrm{d}} u^\varrho \underset{4}{\mathrm{d}} u^\sigma$$

$$= -R^j_{\kappa\lambda\mu:\varrho\sigma} \xi^\kappa \underset{1}{\mathrm{d}} u^\lambda \underset{2}{\mathrm{d}} u^\mu \underset{3}{\mathrm{d}} u^\varrho \underset{4}{\mathrm{d}} u^\sigma \quad (\underset{21}{\Delta} = \underset{21}{\mathrm{dd}} - \underset{12}{\mathrm{dd}}, \mathrm{d}\xi^j = -\Gamma^j_{\kappa\lambda} \xi^\kappa \mathrm{d}u^\lambda).$$

(vi) $\mathfrak{T}$-geodesics $\leftrightarrow P_j^2 \,\mathrm{d}\beta_j/\mathrm{d}s_j = C_{(j)} =$ const. $\mathrm{d}\beta_j = 0 \leftrightarrow j \neq j_\lambda \dot{\leftarrow} 0 \leq j_1 < \ldots < j_l \leq n$, $\Pi^{j_1}_0 \neq \pm 1$ envelopes only;

$$a = j_\lambda \wedge b = j_{\lambda+1} (l > \lambda > 0) \vdash r^*_{(ab)0} = P_a \Pi^b_{a+1} \wedge r^*_{(ab)1} = \sum_{a+1}^{b}{}_m r_m \Pi^b_m.$$

Integration:

$$\mp \beta_b = G(r^*_{(ab)0} : C_{(b)} : r^*_{(ab)1}; \beta_a) \cdot P_a/(C_{(a)} \Pi^b_{a+1}) - \gamma_b \leftarrow \Pi^b_{a+1} \neq 0;$$

$$\mp \beta_b = -\gamma_b + \beta_a \cdot (1 - (C_{(b)}/r^*_{(ab)1})^2)^{-1/2} \cdot (P_a/r^*_{(ab)1})^2 \cdot C_{(b)}/C_{(a)} \leftarrow \Pi^b_{a+1} = 0.$$

Finiteness $\supset$ *closed* $\mathfrak{T}$-geodesics:

$$Q(\varrho, C_1) = G(\varrho : C_1; 1; 0) = \langle p_1^*, m_1^*/|m_0^*| \rangle \cdot \pi \leftarrow \langle 1 - \varrho, 0 \rangle \leq C_1 \leq \langle 1 + \varrho, 1 - \varrho \rangle \wedge m_0^* \langle =, \neq \rangle 0,$$

$C_1 = (1 + \varrho) \sin\alpha_{\min}$; p_1^* fraction (not semi-irrational), m_δ^* β_δ^*-turns on $\mathfrak{T}^*(\varrho, 1)$, C_1 Clairaut constant of a

$\mathfrak{T}^*$-geodesic, α geodesic's azimuth. $\neg$"∞" $\rightarrow \langle p_1$ Egyptian, $m_1 = 1 \vee m_0 = 1\rangle$, *if* no *-projection; no constriction $\rightarrow p_1 = 0$; no "Hohlkosmos-Seitenwechsel" $\rightarrow m_1 = 1 \wedge m_0 > 2$.

Computation.

$$t_0(\varrho, C_1; \beta_0^*) = \tau_0^{\langle +,-\rangle 1}; \qquad t_{1,2,3,4}(\varrho, C_1) = \tau_{1,2,3}^{\langle +,-\rangle 1}, \tau_4^{\langle +,-\rangle}; \qquad t_5(\varrho) = 2\varrho/(1-\varrho^2)^{1/2}.$$

$$\tau_0^{-1} = \tfrac{1}{2}\tau_7\tau_6/\tau_5, \qquad \tau_1^{-1} = 4\varrho C_1/(\tau_7\tau_8), \qquad \tau_2^{-1} = \tfrac{1}{2}(1+\tau_3^{-1}),$$

$$\tau_3^{-1} = C_1/(1-\varrho) = \sin\alpha_{\max}, \qquad \tau_4^- = 2\varrho/(\tau_7\tau_8)^{1/2}.$$

$$\tau_4^+ = (\varrho C_1)^{1/2}/(1-\varrho); \qquad \tau_5 = 1 + \varrho\cos\beta_0^* - C_1, \qquad \tau_6 = 1 + \cos\beta_0^*,$$

$$\tau_7 = 1 + \varrho - C_1, \qquad \tau_8 = 1 - \varrho + C_1.$$

Practicable result:

$$Q(\varrho, C_1) = t_3 t_4 \mathrm{K}(k) - t_5(\mathrm{K}(k)E(k,\Phi) - \mathrm{E}(k)F(k,\Phi)) \leftarrow k^2 = t_1 \wedge \sin^2\Phi = t_2;$$

$$G(\varrho\colon C_1 : 1; \beta_0^*) = t_4(F(k,\varphi) - (1-t_3)\Pi(N,k,\varphi)) \leftarrow \sin^2\varphi = t_0 \wedge -N = t_1 t_2 = (k\sin\Phi)^2,$$

$$t_4(1-t_3)\Pi(N,k,\varphi) = t_5(u\vartheta_1'(U)/\vartheta_1(U) - \tfrac{1}{2}\ln(\vartheta(U+u)/\vartheta(U-u)))$$

$$\leftarrow u : U : x/2 = F(k,\varphi) : F(k,\Phi) : \mathrm{K}(k) \wedge q = \exp(-\pi\mathrm{K}'/\mathrm{K}).$$

ADDENDA. (ii)(iii) $P_0 = r_0, P_{n+1} = r_{n+1} + P_n\cos\beta_n$; see l.c. [5,3.], XLII, p. 478.

(vi) *Computation.* As to 2nd $\langle\ \rangle$-case (with $^{-1}, ^{-}$) see l.c. [8,4.1.1], XLVI, pp. 444/5. $u = \lim\varphi_\nu\colon \varphi_0 = \varphi$, $k_0 = k, k_{\nu+1} = (1-k_\nu')/(1+k_\nu')$,

$$\sin\varphi_{\nu+1} = (1-\Delta_\nu)/((1-k_\nu')\sin\varphi_\nu)$$

or

$$\tan^2\varphi_{\nu+1} = \tan^2\varphi_\nu \cdot \tau_9(k_\nu', \Delta_\nu)/\tau_9(1,\Delta_\nu),$$

where $k_\nu^2 + k_\nu'^2 = 1$, $\Delta_\nu^2 = 1 - k_\nu^2\sin^2\varphi_\nu$, and $\tau_9(k,c) = (k+c)/(1+c)$.

$$\vartheta(z) = \overset{+}{\sum}_\nu T(\nu; z, q), \qquad T(\nu) = (-1)^\nu q^{\nu\nu}\exp(2\nu iz), \quad i^2 = -1;$$

$$\overset{+}{\underset{-}{\sum}}_\nu T(\nu + \tfrac{1}{2}; z, q) = iq^{1/4}\exp(iz)\vartheta(z + \tfrac{1}{2}i\ln q^{-1}) = -\vartheta_1(z), \qquad \vartheta_1'(z) = \mathrm{d}\vartheta_1/\mathrm{d}z.$$

$\mathrm{K}' = \mathrm{K}(k')$, $\mathrm{K} = \mathrm{K}(k) = F(k,\pi/2)$; $(F,E)(k,\varphi) = {}_0^\varphi\!\int \Delta(k,\psi)^{(-1,+1)}\mathrm{d}\psi$, $\mathrm{E}(k) = E(k,\pi/2)$. $\mathrm{K}' : \mathrm{K} : \pi/2 = 1/M(1,k) : 1/M(1,k') : 1$, where M is the arithmetico-geometric mean.