

Universal Multiple-Octet Coded Character Set
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1. Background

Our proposal for encoding of 228 historic scientific characters ([N5277 / L-24-02n](#)), forwarded on February 19, 2024, has been discussed at the WG2-#71 meeting (June 10–14, 2024) in Prague. The discussion led to the idea to forward the several character groups separately, in order to ease the approval process. Hence we intend to submit these character sets in a number of new proposals, of which this document is the 1st.

The background of this proposal is the collaboration of two European institutions: the Leibniz-Archiv: Forschungsstelle der Leibniz-Edition (a department of the Gottfried Wilhelm Leibniz Bibliothek (Hanover, Germany), supervised by the Göttingen Academy of Science and Humanities in Lower Saxony; and the *Philiumm* research group of CNRS (UMR 7219, laboratoire SPHERE) / Université de Paris VII (France), in the *Philiumm* Project (2021–2026), funded by the European Research Council (N° ADG-101020985). The characters proposed appear in the works of Gottfried Wilhelm Leibniz (1646–1716) and his contemporaries.

For more general information about the *Philiumm* project and our research work, please see the doc. N5277.

2. About *Coss* or *coassic* characters

“Coss” (or “Cofs”, historic) is a German term for written or printed treatises about Algebra. It derives from Italian *cosa* (“thing”) which was used to denote variables in calculations.

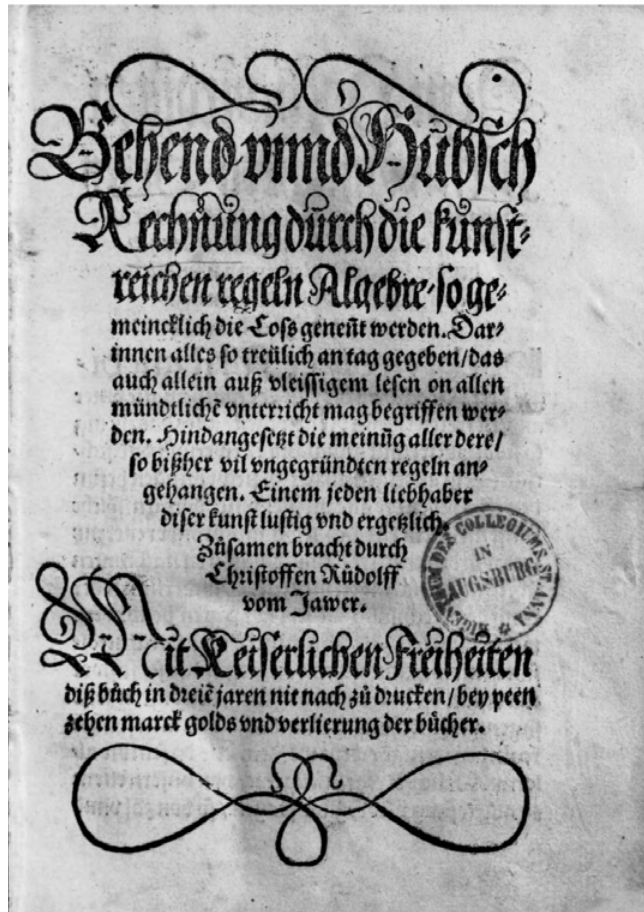
The first printed “Coss” was a book by German mathematician Christoff Rudolff (ca. 1500 – before 1543): *Behend und hübsch Rechnung durch die kunstreichen regeln Algebre, so gemeinlich die Cofs geneñt werden*. (“Handy and neat calculation by the artful Algebre rules, commonly so called the Coss.”) The work was based on older algebra manuscripts which the author studied in Vienna. The book was released in Straßburg 1525 and was out of stock shortly thereafter. Because it was such a desired title, Michael Stifel edited a new and extended version of Rudolff’s *Coss* in 1553.

In the 1525 edition the character “ $\sqrt{}$ ” was used the first time for *radix* in print. For the expression of powers (up to ninth) Rudolff used a set of special abbreviation characters. Some of them were common in writing at the time (and used for different purposes), some were rather special additions. Since this set of cossic characters appears explicitly for a longer time in mathematical literature, we see a need to have them encoded as a whole, in order to enable precise content encoding in facsimile transcriptions of the historic sources.

Title page of Rudolff's *Coss*,
edited in Straßburg 1525.

Source:

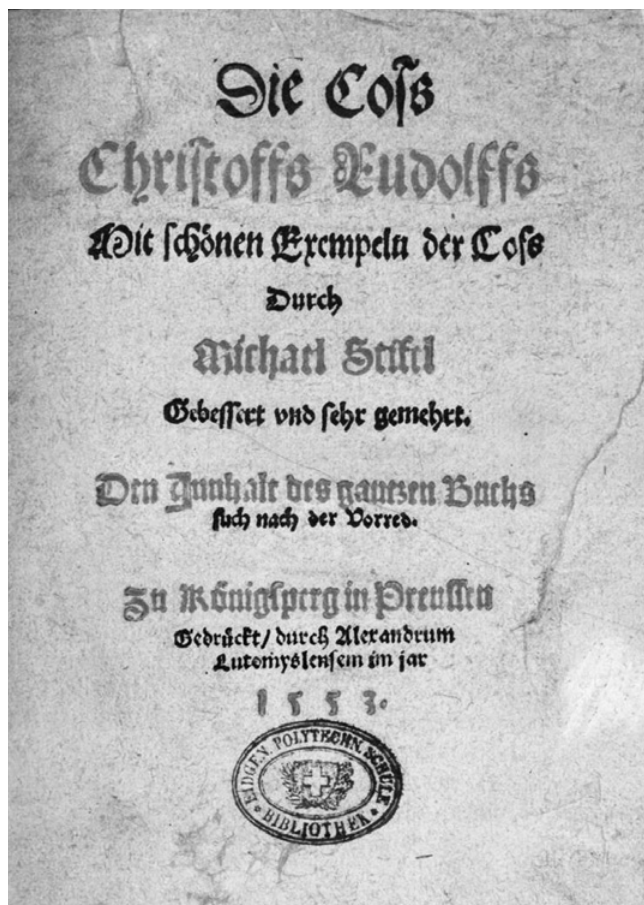
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Title page of Stifel's new edition of
Rudolff's *Coss*,
printed in Königsberg 1553.

Source:

[ETH Zurich](#)



We see a case for encoding this whole set of characters in its particular form and determined by its special meaning and function. For editions of historic sources in facsimile mode it is necessary to encode these symbols accurately and unambiguously.

3. Characters

The cossic characters set consists of two sub-groups. If this proposal gets accepted, the following new characters will exist.

Group 1 is a range of 8 Latin abbreviation characters, derivates from Latin letters c, d, r, f and z. They represent the initials of the names of roots or powers. These characters are comparable to other already encoded abbreviation characters, like ℥ (*libra*, 2114), ℥ (*per*, 214C), ℥ (*denarius/penny*, 20B0), ℥ (*prae-*, A755) or ℥ (*-rum*, A75D) which show a combination of a modified basic shape with some sort of graphic attachment, like scriptive loops directly connected to or crossing the base glyph.

We prefer to encode them as *mathematical symbols*, rather than as *Latin letters*. The aspect of case pairing is not relevant in all of the cases since no capital variants of these characters have ever been used anywhere. “Lowercase” in the proposed character names is merely to indicate the proper ‘parent’ characters. The cossic characters do not occur as abbreviations in general Latin writing but exclusively in calculation contexts. Hence their specific shapes in combination with very specific meaning should justify their encoding, even if an apparent close optical ‘neighbourhood’ to existing characters can be observed.

℥ LOWERCASE C WITH SMALL SLASH
= cubus
• denotes cube of the unknown

℥ LOWERCASE C WITH RIGHT LOOP
= cubus
• denotes cube of the unknown

℥ LOWERCASE C WITH DESCENDER
= census
• denotes square of the unknown

℥ LOWERCASE D ROTUNDA WITH CROSSING LOOP
= dragma
• denotes numerus / constant
→ 1E9F δ latin small letter delta
→ A77A d latin small letter insular d
→ 20B0 ℥ german penny sign

℥ LOWERCASE R ROTUNDA WITH LOOP
= res, radix
• denotes the unknown
→ A75D r latin small letter r rotunda
→ A75D r latin small letter rum rotunda
→ A776 R latin letter small capital rum
→ 221A $\sqrt{\quad}$ square root

ß LOWERCASE DOUBLE S ABBREVIATION SIGN

- = sursolidum
- denotes fifth power of the unknown
- also used as abbreviation for solidus, semis
- 017F ł latin small letter long s
- 0073 s latin small letter s
- 00DF ſ latin small letter sharp s
- A7D7 ß latin small letter middle scots s

ſ LOWERCASE LONG S WITH TOP LOOP

- = sursolidum
- denotes fifth power of the unknown
- 017F ł latin small letter long s
- 1E9C ſ latin small letter long s with diagonal stroke
- 1E9D ſ̄ latin small letter long s with high stroke

z LOWERCASE KURRENT Z SIGN

- = zensus
- denotes square of the unknown
- 0292 z latin small letter ezh

Group 2 is a set of *root* or *radix* symbols, their shapes being related to $\sqrt{\quad}$ (221A).

∞ RADIX SIGN 1
= fourth root
→ 221A $\sqrt{\quad}$ square root

∞∞ RADIX SIGN 2
= eighth root
→ 221A $\sqrt{\quad}$ square root

∞∞∞ RADIX SIGN 3
= sixteenth root
→ 221A $\sqrt{\quad}$ square root

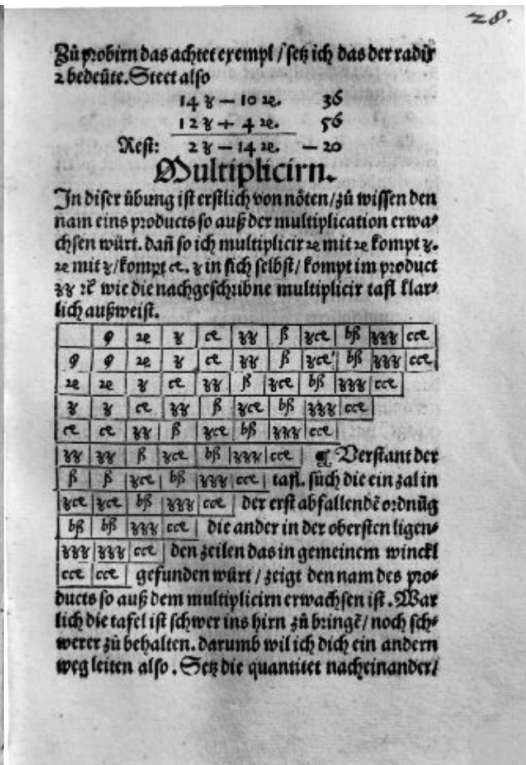
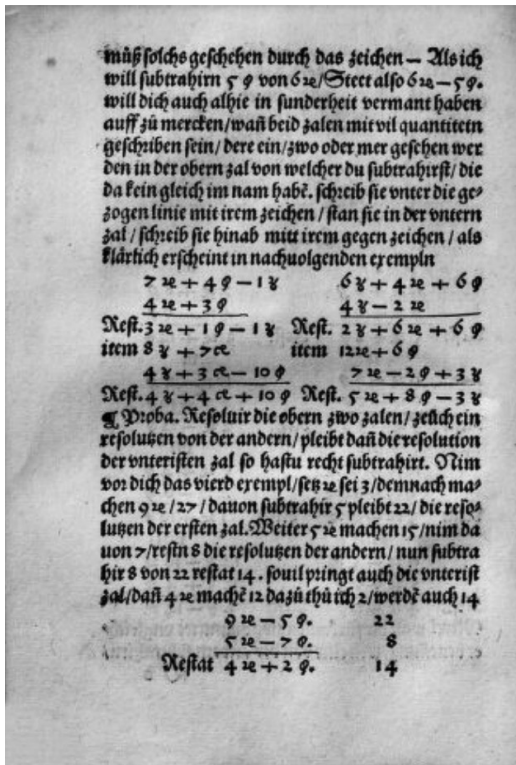
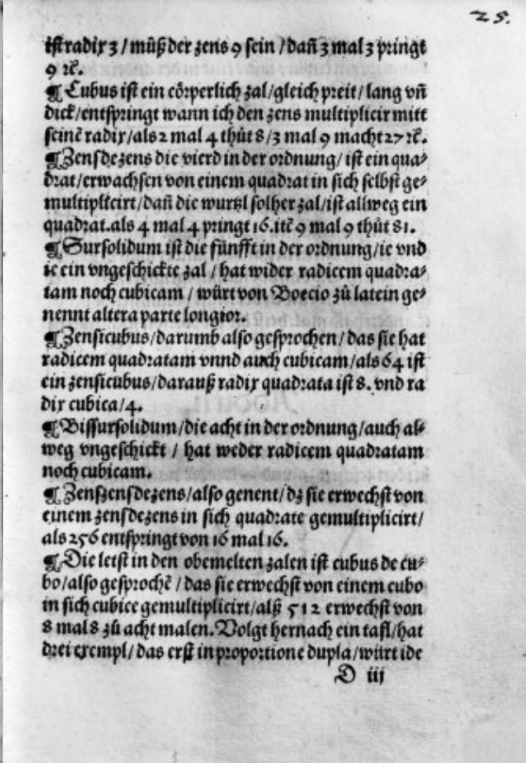
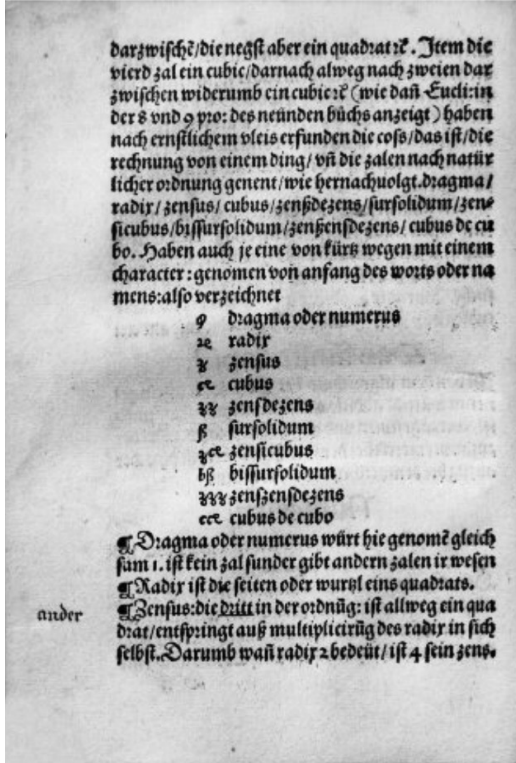
In group 1 there are two different characters for “cubus”: \mathfrak{C} and \mathfrak{C}° ; two different characters for “census/zensus”: \mathfrak{z} and \mathfrak{z}° ; and two different characters for “sursolidum”: $\mathfrak{ß}$ and $\mathfrak{ſ}^{\circ}$. Although the meaning is the same in either pairing, the actual glyphs differ considerably (most obvious with “census/zensus”) and these typographic differences are strongly tied to certain writing or publishing traditions. In an edition of sources it would not be tolerable to encode e.g. $\mathfrak{ß}$ instead of $\mathfrak{ſ}^{\circ}$. Therefore we propose to encode all the characters, thus being in line with a principle which has been followed in e.g. the alchemical characters block, where also (in some cases) two or three different characters bear (basically) the same meaning.

Because the small capital R with stroke \mathfrak{R} (A776) does also belong to the set of cossic characters, we additionally propose a new notation to this character in the standard:

A776 \mathfrak{R} LATIN LETTER SMALL CAPITAL RUM
• cossic sign for res, radix
→ XXXX \mathfrak{r} lowercase r rotunda with loop
→ A75D \mathfrak{r} latin small letter rum rotunda

4. Figures and explanations

The *Coss* characters became a widely adopted set of characters for denoting powers and roots, in the 16th and 17th century. We show a couple of instances from printed sources and also a piece of manuscript evidence by Leibniz. See page 17 for a synopsis of all characters belonging to the first group.



Christoff Rudolff: *Behend und hübsch Rechnung durch die kunstreichen regeln Algebre*, so gemeinlich die *Coss* genennt werden. Straßburg 1525. fol. 24v-25r, 27v-28r.

resolution der vnteristen zal / so hastu recht gemul-
tiplicirt. Als ich wil probirn dz drit exempl / sehe den
werdt radicis 5. demnach würt die erst der obern:
nemlich 6 2e + 8 9: resoluir in 38. die ander in 18 /
multiplicir 38 mit 18 komen 684. souil bedüt auch
das facit / daß 30 8 machen 750 / dauon subtrahir
10 / als den werdt 222 / mer subtrahir 56 / bleiben 684
hab ich wellen probiren.

Diuidirn.

Was du hast diuidirt die grösser quantitet durch
die kleiner / wilt wissen den nam des quocients / Bee
in die nachuolgend tassl / süch die grösser quantitet in
der obern / die kleiner in der vntern überck hengen
den zeilen so würt dir in gemeinem winkel der nam
des quocients angezeigt.

	9	2e	8	ce	38	β	3ce	bβ	338	ce
9	9	2e	8	ce	38	β	3ce	bβ	338	ce
	2e	9	2e	8	ce	38	β	3ce	bβ	338
		8	9	2e	8	ce	38	β	3ce	bβ
			ce	9	2e	8	ce	38	β	3ce
				38	9	2e	8	ce	38	β
					β	9	2e	8	ce	38
						3ce	9	2e	8	ce
							bβ	9	2e	8
								338	9	2e
									ce	9

30.
Was ein quantitet würt geteilt durch ein andere in
im namen gleich / kompt alweg 9 im quocient. würt
ein quantitet durch 9 geteilt / so kompt solch quanti-
tet im quocient. daß 9 verändert keine quantitet wi-
der im multiplicirn nach diuidirn.

¶ Ein ander weiß / den nam des quocients zu süchē
wan die grösser geteilt würt durch ein kleinere oder
gleiche quantitet.

Schreib die quantitet nacheinander vñ verzeichē
sie mit der zal natürlicher ordnung / wie du im mul-
tiplicirn gelemnt hast also.

0 1 2 3 4 5 6 7 8 9
9 2e 8 ce 38 β 3ce bβ 338 ce

Subtrahir die zal der kleinern von der zal der gröf-
fern quantitet / durch dz übrig würt fundt der nam
des quocients. Als ich diuidir β durch ce / subtrahir
3 von 5 resten 2 / zeigt das der quocient sei 2. Item
ich diuidir 3ce durch β / subtrahir 5 von 6 restat 1 /
zeigt im quocient 2e. Item ich diuidir ce durch ce /
subtrahir 3 von 3 restat 0 / zeigt 9. Des zu merern
verstandi nim dise exempl. Ich diuidir 6 8 durch 2
2e Stet also.

6 8 (fa: 32e. Item 5 ce (fa: 2 1/2. Item 12 8 (fa: 4 9
22e 22e 3 8

¶ Proba. Resoluir beide zalen. Diuidir ein resolu-
ren durch die ander / das auß solcher teilung komen
würdt / müß gleich sein des quocients resoluren.
Zu einer prob nim das erst exempl / set den werde

diuidirt werd durch 3. Darumb laß dich alhie nit
tiren / was oben im fünfften capitul des ersten teils
bey der diuision gesagt ist.

¶ Die erst equation oder regl der cofe.

Was zwo quantitetn natürlicher ordnung einan-
der gleich werden / diuidir die kleiner in die grösser
quantitet / der quocient zeigt an den werdt 12e. Als
in disen exempln.

Die teiler

3 2e	6 9
4 8	8 2e
5 ce	10 8
6 38	12 ce
7 β	14 38 facit 12e. 29
8 3ce	16 β
9 bβ	18 3ce
10 338	20 bβ
11 ce	22 338

¶ Die ander equation.

Was zwo quantitetn einander gleich werden / zwi-
schen welchen eine: natürlicher ordnung nach be-
griffen: geschwigen ist. Diuidir die kleiner in die
größer quantitet / radic quadrata des quocients zeigt
an den werdt 12e. Als

54.
Die teiler

2 8	8 9
3 ce	12 2e
4 38	16 8
5 β	20 ce fa: 12e. 29
6 3ce	24 38
7 bβ	28 β
8 338	32 3ce
9 ce	36 bβ

¶ Die dritt equation.

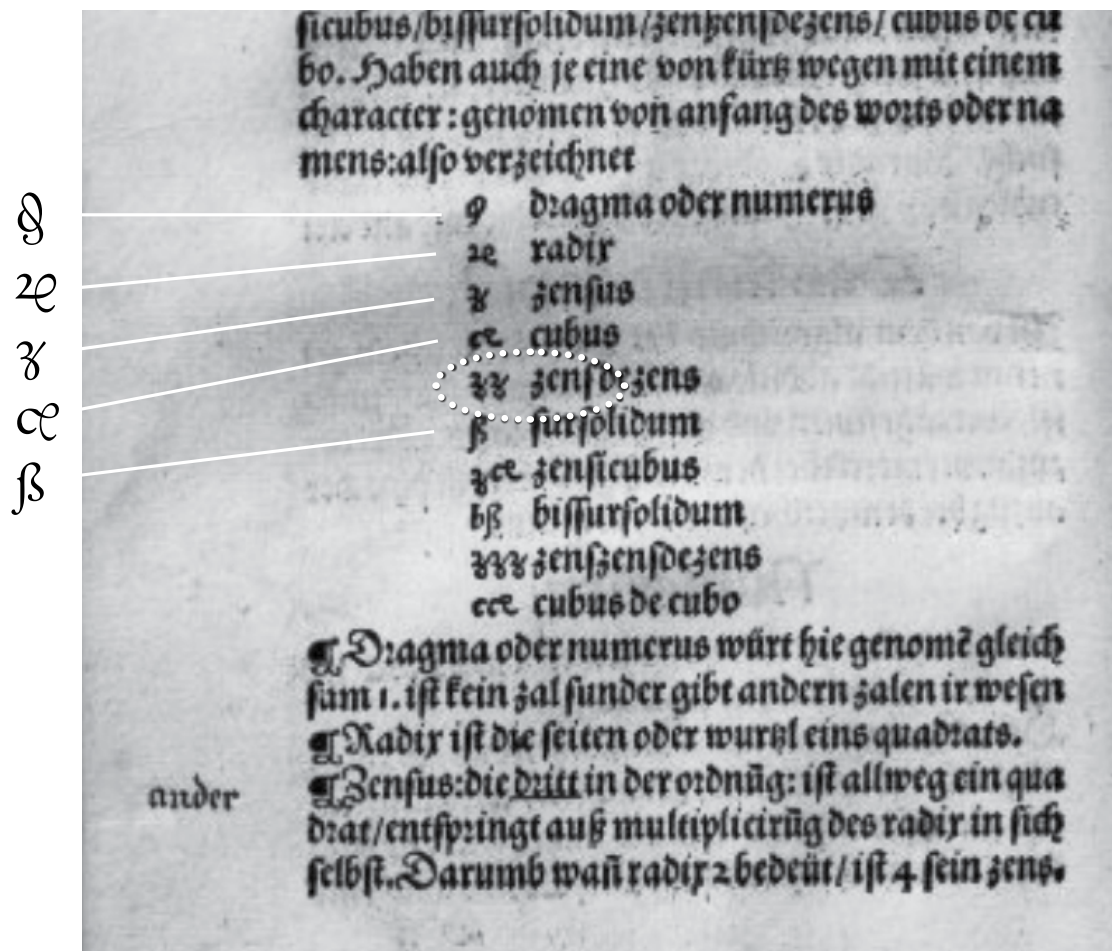
Was zwo quantitetn einander gleich werden / zwi-
schen welche zwo andere: natürlicher ordnung nach
begriffen: geschwige sein. Diuidir die kleiner in die
größer quantitet / radic cubica des quocients zeigt an
den werdt 12e. Als

Die teiler


2 ce	16 9
3 38	24 2e
4 β	32 8
5 3ce	40 ce fa: 12e. 22e. 29
6 bβ	48 38
7 338	56 β
8 ce	64 3ce

Die vierd equation

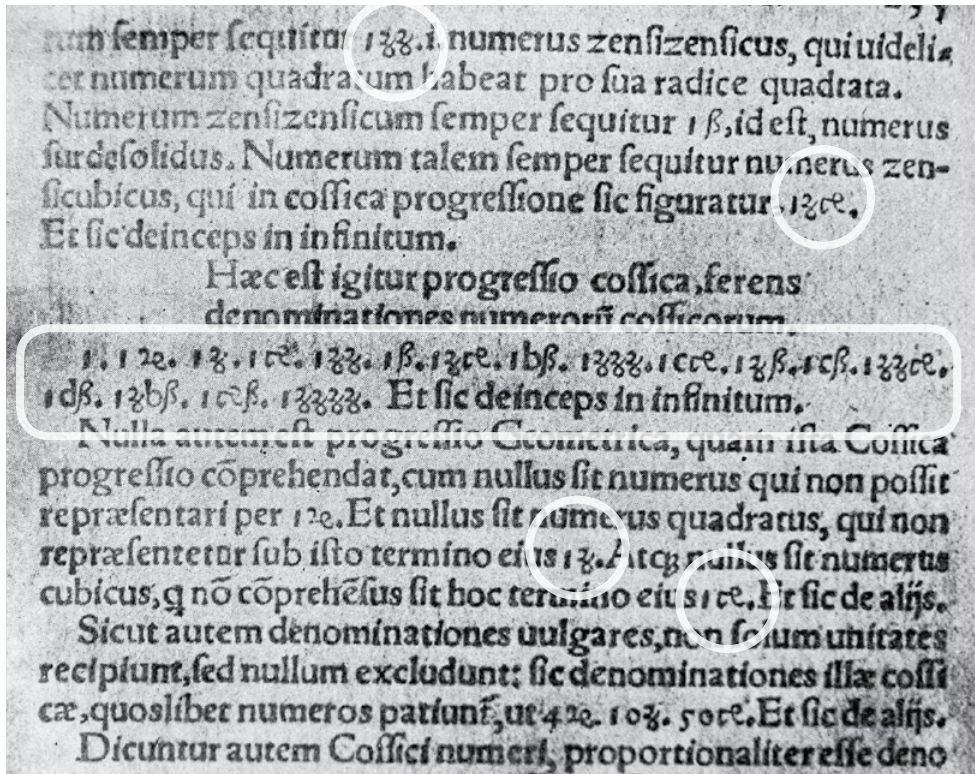
Was zwo quantitetn einander gleich werden / zwi-
schen welche / drey andere natürlicher ordnung nach
begriffen / geschwige sein. Diuidir die kleiner in die
größer quantitet / Radix quadrata von radice qua-
drata des quocients / zeigt an den werdt 12e. Als



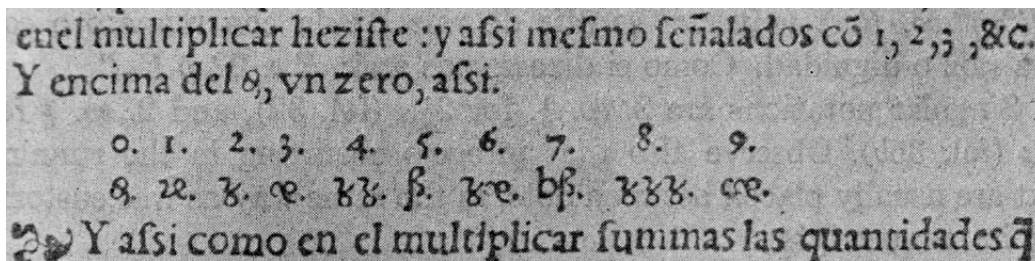
Christoff Rudolff: *Behend und hübsch Rechnung* ... Straßburg 1525, part of fol. 24v. In this chapter Rudolff introduces the set of root and power symbols by samples and explanations. We can see: ʒ LOWERCASE KURRENT Z SIGN, § LOWERCASE D ROTUNDA WITH CROSSING LOOP, 2e LOWERCASE R ROTUNDA WITH LOOP, c LOWERCASE C WITH RIGHT LOOP and β LOWERCASE DOUBLE S ABBREVIATION SIGN.

This print demonstrates the deliberate distinction between the cossic character ʒ and the normal fraktur ʒ (see at ). Whereas in other scenarios this two shapes could be seen as ‘just’ glyph variants without semantic distinction, in this case the form difference is clearly an indicator for a specific meaning. The character ʒ LOWERCASE KURRENT Z SIGN is denoting *zensus*. It is semantically determined by this one unambiguous meaning, and graphically characterized by a) a round-shaped upper part (mostly), and b) a prominent loop descender which crosses upwards. The origin of its shape is neither *Fraktur* type nor Latin script style but the German *Kurrent* writing style. Therefore the character is neither to be unified with *ezh* (0292) nor with any of the mathematical alphanumeric characters 1D4B5 etc^a, in order to secure its specific semantic content.

The character β should not be unified with LATIN SMALL LETTER SHARP S (00DF, its somewhat obscure origin going back to medieval long-s abbreviation characters and later becoming typographically a ligature of long s and z in blackletter styles). Whereas the β character is clearly and unambiguously based on the ligation of f and s in order to facilitate a crisp abbreviation sign for frequently occurring words like *femis*, *solidus* or *fursolidus*. Since the German B appears in various shapes nowadays in typefaces (e.g. in Times – like seen here – it is definitely not a f-s ligature), it would be misleading to assign 00DF to the special usage shown in these examples.



Stifel 1544 (after Cajori). This sample shows ꝛ LOWERCASE KURRENT Z SIGN, 2e LOWERCASE R ROTUNDA WITH LOOP, ce LOWERCASE C WITH RIGHT LOOP and ß LOWERCASE DOUBLE S ABBREVIATION SIGN.



Aurel 1552, fol. 73B (after Cajori). This sample shows ꝛ LOWERCASE KURRENT Z SIGN (2., 4., 6., 8.), 0. LOWERCASE D ROTUNDA WITH CROSSING LOOP (0.), 2e LOWERCASE R ROTUNDA WITH LOOP (1.), ce LOWERCASE C WITH RIGHT LOOP (3., 6., 9.), and ß LOWERCASE DOUBLE S ABBREVIATION SIGN (7.).

These samples also show how those characters were used in combination to express the powers 4th and so on.

nous fournit de termes consecutiz, pour exposer les nombres Radicaus e leurs Singes: comme vous voyez par la Table ici mise.

0, 1, 2, 3, 4 5, 6, 7, 8, 9, 10,
 1, R, c, q, cc, ß, cq, bß, ccc, qq, cß,
 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024,
 11, 12, 13, 14, 15, 16.
 cß, ccq, dß, cßß, cqß, cccq.
 2048, 4096, 8192, 16384, 32768, 65536.

L'ordre des Exposans composez.

4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24,
 25, 26, &c.

L'ordre des Singes composez.

cc, cq, ccc, qq, cß, ccq, cßß. &c. La ou vous noterez, que le Çantique ét toujours participant, ou le Cube redouble.

L'ordre des Exposans incomposez.

Exemple de la Diuision.

Ie veü diuiser 30c m. 58R, p. 24, par 5R m. 3.
 La posicion sera comme vous voyez,

40
 30c m. 58R p. 24
 5R m. 3.
 —————
 30c m. 18R.

Ie di donq ainsi : 5 an 30 font com-

Three extracts from Peletier 1554: ç LOWERCASE C WITH DESCENDER, cc LOWERCASE C WITH RIGHT LOOP and ß LOWERCASE DOUBLE S ABBREVIATION SIGN.

These samples also demonstrate the usage of R (A776) as part of the cossic set, as well as the use of slashed figures (on which we elaborate in another proposal).

to uoide the tedious repetition of these woordes: is equalle to: I will sette as I doe often in woorde bse, a paire of paralleles, or Gemowe lines of one lengthe, thus: =====, bicause noe. 2. thynges, can be moare equalle. And now marke these numbers.

1. 14.ꝛ. + 15.ʒ. ===== 71.ʒ.
 2. 20.ꝛ. ----- 18.ʒ. ===== 102.ʒ.
 3. 26.ʒ. + 10.ꝛ. ===== 9.ʒ. ----- 10.ꝛ. + 213.ʒ.
 4. 19.ꝛ. + 192.ʒ. ===== 10.ʒ. + 108.ʒ. ----- 19.ꝛ.
 5. 18.ꝛ. + 24.ʒ. ===== 8.ʒ. + 2.ꝛ.
 6. 34.ʒ. ----- 12.ꝛ. ----- 40.ꝛ. + 480.ʒ. ----- 9.ʒ.
1. In the firste there appeareth. 2. numbers, that is
14.ꝛ.

Another Example of Addition.

$$\begin{array}{r}
 5.ʒ.℄. + 20.℄. ----- 3.ʒ. \\
 \hline
 5.ʒ.℄. + 3.ʒ. \\
 \hline
 6.℄℄.
 \end{array}
 \quad \text{to} \quad
 \begin{array}{r}
 20.℄. ----- 6.ʒ. \\
 \hline
 6.℄℄.
 \end{array}$$

6.℄℄.

That is in les-
ser termes.

$$\begin{array}{r}
 5.℄. + 20.ʒ. ----- 3.ʒ. \\
 \hline
 6.ʒ.℄.
 \end{array}$$

Here is noe multiplication, noꝝ reduction to one common denominatoꝝ: sith thei bee one all ready: noꝝ

Two extracts from Recorde 1557 (after Cajori): ℄ LOWERCASE C WITH RIGHT LOOP, ʒ LOWERCASE D ROTUNDA WITH CROSSING LOOP, ꝛ LOWERCASE R ROTUNDA WITH LOOP and ʒ LOWERCASE KURRENT Z SIGN.

℞
 ꝛ
 Ꝟ
 ꝟ

Nonina.		Characteres.			Pote
Radix	℞	R	A	a	a
Quadratum	ꝛ	ℚ	Aq	aa	a ²
Cubus	Ꝟ	C	Ac	aaa	a ³
Quad. quadratum	ꝛꝛ	ℚℚ	Aqq	aaaa	a ⁴
Surdefolidum	ꝟ	S	Aqc	&c.	a ⁵
Quad. Cubi.	ꝛꝞ	ℚC	Acc		a ⁶
2 ^m Surdefolidum.	Bꝟ	hS	Aqqc		a ⁷
Quad. quad. quad.	ꝛꝛꝛ	ℚℚℚ	Aqcc		a ⁸
Cubi cubus	ꝞꝞ	CC	Accc		a ⁹
Quad. Surdefol.	ꝛꝟ	ℚS	Aqqcc		a ¹⁰
3 ^m Surdefolidum	Cꝟ	cS	Aqccc		a ¹¹
Quad. quad. cubi.	ꝛꝛꝞ	ℚℚC	Acccc		a ¹²
4 ^m Surdefolidum	Dꝟ	dS	Aqqccc		a ¹³
quad. 2 ⁱ Surdefol.	ꝛꝟꝟ	ℚbS	Aqcccc		a ¹⁴
Cubus Surdefol.	Ꝟꝟ	CS	Accccc		a ¹⁵
Quad. quad. quad. quad.	ꝛꝛꝛꝛ	ℚℚℚℚ	Aqqcccc		a ¹⁶
&c.					

From Wallis, Operum mathematicorum, 1657 (after Cajori); shows the use of ꝟ LOWERCASE LONG S WITH TOP LOOP for “sursolidum”.

The ꝛ LOWERCASE KURRENT Z SIGN has been given a sort of ‘Latinization treatment’ here, based rather on the Greek/Roman zeta shape. We regard this as a glyph variant with no distinctive meaning.

1 ① sec ① Produit d'une prime quantité par une prime quantité secondement posée.

5 ④ ter ② Produit de cinq quartes quantitez par une seconde quantité tiercement posée.

Les caracteres signifians racines de quels l'explication se trouve à la 29 & 30 definition sont tels :

✓ Racine de quarré.

✓✓ Racine de racine de quarré.

✓✓✓ Racine de racine de racine de quarré.

✓✓✓✓ Racine de racine de racine de racine de quarré.

✓ ③ Racine de cube.

✓✓ ③ Racine de racine de cube.

✓ ④ Racine de quarte quantité.

✓✓ ④ Racine de racine de quarte quantité, &c.

Le caractere signifiant la separation entre le signe de racine & la quantité, duquel l'explication se trouve à la 34. definition, est tel.

χ, Comme ✓ 3 χ ② n'est pas le mesme que ✓ 3 ②, comme dict est à ladicte 34. definition.

Les caracteres signifians plus & moins, comme à la 36 definition, sont tels :

+ Plus.

— Moins.

Et pour expliquer la racine d'un multinomie (qu'aucuns appellent racine universelle) nous userons le vocable du multinomie, comme:

✓ bino 2 + ✓ 3, c'est à dire racine quarrée de binomie, ou de la somme de 2 & ✓ 3.

✓ trino ✓ 3 + ✓ 2 — ✓ 5, c'est à dire racine quarrée de trinomie, ou de la somme de ✓ 3 & ✓ 2 & — ✓ 5.

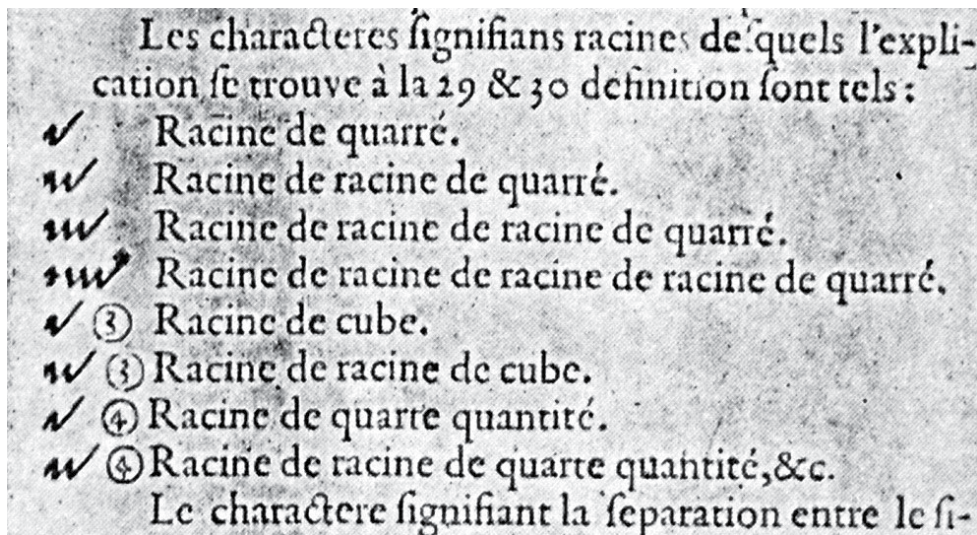
✓ ③ bino ✓ 2 + ✓ 3, c'est à dire racine cubique de

see also
next page

✓✓✓ RADIX SIGN 1, ✓✓✓✓ RADIX SIGN 2, ✓✓✓✓✓ RADIX SIGN 3

These characters can be seen related to the established radix symbol ✓ (221A).

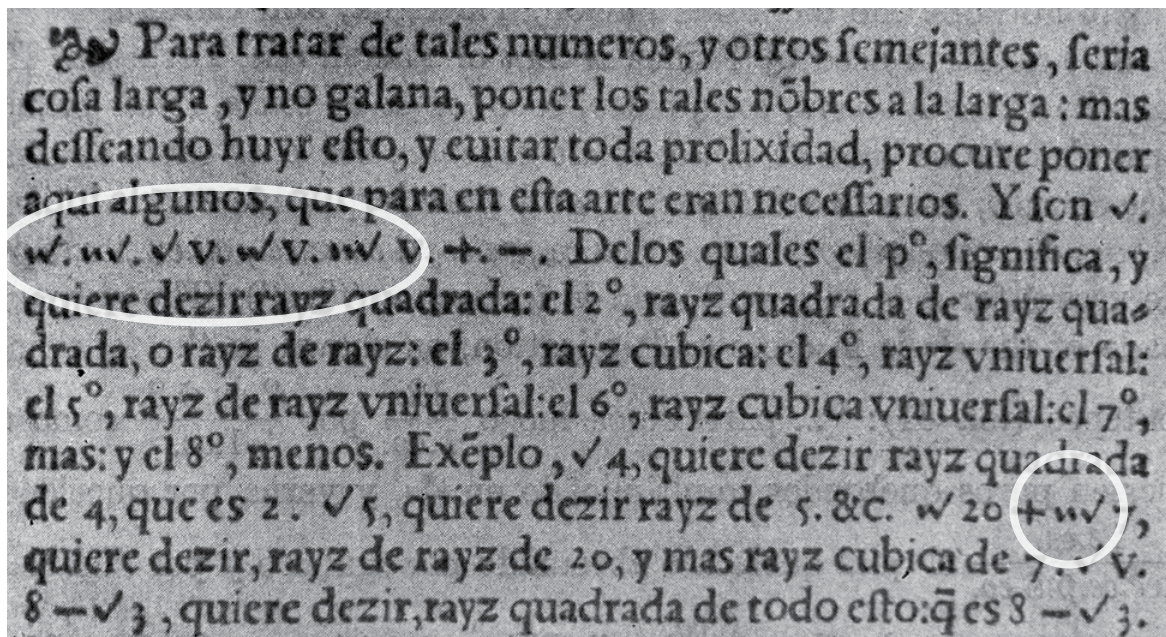
Simon Stevin, L'arithmétique in Œuvres mathématiques, 1634 (after Cajori)



Simon Stevin, L'arithmétique in Œvres mathématiques, 1634 (after Cajori)






















































The number of ascending lines indicates how often an operation of root determination is performed on an expression. In the Stevin example the combination with an encircled number indicates, which type of root is meant. If there is no such number, the square root is to be considered. For example, the combinations denote the following:

- ✓✓ square root of square root, which corresponds to the fourth root;
- ✓✓✓ square root of square root of square root, which corresponds to the eighth root;
- ✓✓✓✓ square root of square root of square root of square root, which corresponds to the sixteenth root;
- ✓✓ ③ cubic root of cubic root, which corresponds to the ninth root;
- ✓✓ ④ fourth root of fourth root, which corresponds to the sixteenth root.



✓✓ RADIX SIGN 1, ✓✓✓ RADIX SIGN 2, ✓✓✓✓ RADIX SIGN 3
Marco Aurel, Arithmetica algebrica, 1552 (after Cajori)

5. Synopsis (Group 1)

	Glyph								
	Character	LOWERCASE D ROTUNDA WITH CROSSING LOOP	LOWERCASE R ROTUNDA WITH LOOP	LOWERCASE KURRENT Z SIGN	LOWERCASE C WITH DESCENDER	LOWERCASE C WITH SMALL SLASH	LOWERCASE C WITH RIGHT LOOP	LOWERCASE DOUBLE S ABBREVIATION SIGN	LOWERCASE LONG S WITH TOP LOOP
	Meaning	dragma	radix	zensus	census	cubus	cubus	solidus sursolidum semis	sursolidum
1	Rudolf 1525								
2	Stifel 1544								
3	Aurel 1552								
4	Peletier 1554								
5	Recorde 1557								
6	Dee 1570								
7	Peletier 1620								
8	Clavius 1608/12								
9	Beeckmann 1628								
10	Wallis 1657								
11	Leibniz MS 1676								
12	MS Leiden 17. c.								
13	MS Hamburg 17. c.								

Comparative survey of Cossic characters in various sources, 1525 to 1676.

6. Unicode Character Properties

xi01;LOWERCASE C WITH SMALL SLASH;Sm;0;ON;;;;;N;;;;;
xi02;LOWERCASE C WITH DESCENDER;Sm;0;ON;;;;;N;;;;;
xi03;LOWERCASE C WITH RIGHT LOOP;Sm;0;ON;;;;;N;;;;;
xi04;LOWERCASE D ROTUNDA WITH CROSSING LOOP;Sm;0;ON;;;;;N;;;;;
xi05;LOWERCASE R ROTUNDA WITH LOOP;Sm;0;ON;;;;;N;;;;;
xi06;LOWERCASE DOUBLE S ABBREVIATION SIGN;Sm;0;ON;;;;;N;;;;;
xi07;LOWERCASE LONG S WITH TOP LOOP;Sm;0;ON;;;;;N;;;;;
xi08;LOWERCASE KURRENT Z SIGN;Sm;0;ON;;;;;N;;;;;
xi09;RADIX SIGN 1;Sm;0;ON;;;;;N;;;;;
xi10;RADIX SIGN 2;Sm;0;ON;;;;;N;;;;;
xi11;RADIX SIGN 3;Sm;0;ON;;;;;N;;;;;

“x” stands for *unspecified codespace*. “i” refers to our internal characters classification, see N5277.

7. Bibliography

LAA – refers to: Leibniz, Gottfried Wilhelm: Sämtliche Schriften und Briefe. (‘Leibniz-Akademie-Ausgabe’, many volumes)

LBr – refers to: Leibniz’s original correspondence papers, GWLB Hanover

LH – refers to: Leibniz’s original manuscripts, GWLB Hanover

Aurel, Marco: Arithmetica algebraica, Valencia 1552

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— : L’Algebra. Milan 1966

Cajori, Florian: A history of mathematical notations. Chicago 1928

Cardano, Gerolamo: Opera omnia. Lyon 1663

Clavius, Christophorus: Algebra. Rome 1608

Dee, John: [preface] in: Euclid: The elements. Henry Billingsley (ed.), London 1570

Descartes, René: La Géométrie. Leiden 1637

Dulaurens, François: Specimina Mathematica. Paris 1667

Ghaligai, Francesco: Pratica d’Arithmetica, Florence 1552

Peletier, Jaques: L’Algèbre. Lyon 1554

Probst, Siegmund: Édition des symboles de Leibniz. PDF, Hanover 2023 (presentation Paris 2023)

Rudolff, Christoff: Behend und hübsch Rechnung durch die kunstreichen regeln Algebre, so gemeincklich die Coß genennt werden. Straßburg 1525

Stevin, Simon: Œvres mathématiques. Leiden 1634

Stifel, Michael: Arithmetica integra. Nürnberg 1544

Wallis, John: De sectionibus conicis nova methodo expositis tractatus. Oxford 1655

— : Operum mathematicorum, Oxford 1657

— : Treatise of Algebra. London 1685

**ISO/IEC JTC 1/SC 2/WG 2
PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS
FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646¹**

Please fill all the sections A, B and C below.

Please read Principles and Procedures Document (P & P) from <http://std.dkuug.dk/JTC1/SC2/WG2/docs/principles.html> for guidelines and details before filling this form.

Please ensure you are using the latest Form from <http://std.dkuug.dk/JTC1/SC2/WG2/docs/summaryform.html>.
See also <http://std.dkuug.dk/JTC1/SC2/WG2/docs/roadmaps.html> for latest *Roadmaps*.

A. Administrative

1. **Title:** **Proposal to add 11 cossic characters to the UCS**

2. Requester's name: Uwe Mayer, Siegmund Probst, David Rabouin, Elisabeth Rinner, Andreas Stötzner, Achim Trunk, Charlotte Wahl

3. Requester type (Member body/Liaison/Individual contribution): Individual (work group)

4. Submission date: 2024-09-17

5. Requester's reference (if applicable): LUCPL-2438

6. Choose one of the following:
This is a complete proposal: Yes
(or) More information will be provided later: -----

B. Technical – General

1. Choose one of the following:
a. This proposal is for a new script (set of characters): No
Proposed name of script: -----
b. The proposal is for addition of character(s) to an existing block: Yes
Name of the existing block: *since no space is available in the various Math symbols blocks, we propose a new block Miscellaneous Mathematical Symbols-C or similar. This new block can also accomodate other related new character sets we will propose (see N5277)*

2. Number of characters in proposal: 11

3. Proposed category (select one from below - see section 2.2 of P&P document):
A-Contemporary B.1-Specialized (small collection) B.2-Specialized (large collection)
C-Major extinct D-Attested extinct E-Minor extinct
F-Archaic Hieroglyphic or Ideographic G-Obscure or questionable usage symbols

4. Is a repertoire including character names provided? Yes
a. If YES, are the names in accordance with the “character naming guidelines” in Annex L of P&P document? Yes
b. Are the character shapes attached in a legible form suitable for review? Yes

5. Fonts related:
a. Who will provide the appropriate computerized font to the Project Editor of 10646 for publishing the standard? Andreas Stötzner
b. Identify the party granting a license for use of the font by the editors (include address, e-mail, ftp-site, etc.): Andreas Stötzner Gestaltung, Klauflügelweg 21, 88400 Biberach/R., Germany, as@signographie.de

6. References:
a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided? Yes
b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached? Yes

7. Special encoding issues:
Does the proposal address other aspects of character data processing (if applicable) such as input, presentation, sorting, searching, indexing, transliteration etc. (if yes please enclose information)? No

8. Additional Information:
Submitters are invited to provide any additional information about Properties of the proposed Character(s) or Script that will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script. Examples of such properties are: Casing information, Numeric information, Currency information, Display behaviour information such as line breaks, widths etc., Combining behaviour, Spacing behaviour, Directional behaviour, Default Collation behaviour, relevance in Mark Up contexts, Compatibility equivalence and other Unicode normalization related information. See the Unicode standard at <http://www.unicode.org> for such information on other scripts. Also see Unicode Character Database (<http://www.unicode.org/reports/tr44/>) and associated Unicode Technical Reports for information needed for consideration by the Unicode Technical Committee for inclusion in the Unicode Standard.

¹ Form number: N4502-F (Original 1994-10-14; Revised 1995-01, 1995-04, 1996-04, 1996-08, 1999-03, 2001-05, 2001-09, 2003-11, 2005-01, 2005-09, 2005-10, 2007-03, 2008-05, 2009-11, 2011-03, 2012-01)

C. Technical - Justification

1. Has this proposal for addition of character(s) been submitted before? If YES explain	Yes see N5277 / L-24-02n
2. Has contact been made to members of the user community (for example: National Body, user groups of the script or characters, other experts, etc.)? If YES, with whom?	Yes Leibniz-Archiv, Forschungsstelle der Leibniz-Edition, Niedersächsische Landesbibliothek (GWLb), Hanover, Göttingen Academy of Science and Humanities in Lower Saxony (DE), Philiumm research group of CNRS (UMR 7219, laboratoire SPHERE) / Université de Paris VII; general: scholars, researchers, authors and editors working in the field of science history and upon editions of historic text corpora (e.g. of G. W. Leibniz, but also many others)
If YES, available relevant documents:	L-2409, L-2410
3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included? Reference:	Yes
4. The context of use for the proposed characters (type of use; common or rare) Reference:	Common mainly specialist usage, scholarly, worldwide
5. Are the proposed characters in current use by the user community? If YES, where? Reference:	Yes mainly Europe, Americas; other countries
6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely in the BMP? If YES, is a rationale provided? If YES, reference:	No
7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)?	Yes
8. Can any of the proposed characters be considered a presentation form of an existing character or character sequence? If YES, is a rationale for its inclusion provided? If YES, reference:	No
9. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters? If YES, is a rationale for its inclusion provided? If YES, reference:	No
10. Can any of the proposed character(s) be considered to be similar (in appearance or function) to, or could be confused with, an existing character? If YES, is a rationale for its inclusion provided? If YES, reference:	No
11. Does the proposal include use of combining characters and/or use of composite sequences? If YES, is a rationale for such use provided? If YES, reference: Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided? If YES, reference:	No No
12. Does the proposal contain characters with any special properties such as control function or similar semantics? If YES, describe in detail (include attachment if necessary)	No
13. Does the proposal contain any Ideographic compatibility characters? If YES, are the equivalent corresponding unified ideographic characters identified? If YES, reference:	No