One-parameter 2-equipped posets and classification of their corepresentations

Claudio Rodríguez
Universidad del Rosario, Colombia.

ICRA XV
Bielefeld

2012

In memory of Alexander G. Zavadskij

5/8/1946 - 2/2/2012

Content

1. 2-equipped posets
2. Corepresentations
3. 2-equipped posets of one parameter type
4. Main Results

Content

1. 2-equipped posets
2. Corepresentations
3. 2-equipped posets of one parameter type
4. Main Results

Content

1 2-equipped posets

2 Corepresentations

3 2-equipped posets of one parameter type

4 Main Results

Content

1. 2-equipped posets
2. Corepresentations
3. 2-equipped posets of one parameter type
4. Main Results

Introduction

Representations of posets (partially ordered sets) are studied in algebraic representation theory.

- P. Gabriel & A.V. Roiter, *Representations of Finite Dimensional Algebras*, Algebra VIII, Encyclopedia of Math. Sc., **73**, Springer, (1992).
- C.M. Ringel, *Tame Algebras and Integral Quadratic Forms, LMN*, Springer, **1099** (1984).
- D. Simson, *Linear representation of partially ordered sets and vector space categories*, Algebra, logic and applications, **4**, Gordon & Breach Sci. Publ., (1992).

Introduction

Representation theory of posets starts to be studied since 70's

L. A. Nazarova & A. V. Roiter, *Representations of partially ordered sets*, Zap. Nauchn. Semin. LOMI, **28**, (1972), 5–31. In Russian, English transl. in: J.Sov.Math. 3 (1975), 585–606.

P. Gabriel, *Unzerlegbare Darstellungen I*, Manuscripta Math. **6**, (1972), 71–103.

Cases of finite and one-parameter representation type

M. M. KLEINER, *Partially ordered sets of finite type*, Zap. Nauchn. Semin. LOMI, **28**, (1972), 32–41. In Russian, English transl. in: J.Sov.Math. **3** (1975).

M. M. KLEINER, *On faithful representations of partially ordered sets of finite type*, Zap. Nauchn. Semin. LOMI, **28**, (1972), 42–59. In Russian, English transl. in: J.Sov.Math. **3** (1975).

V. V. OTRASHEVSKAYA, *On one-parameter partially ordered sets*, Ukr. Math. J., **28**, (1976), 334–341.

Introduction

Matrix problems over one or several fields

B. Klemp & D. Simson, *Schurian sp-representation-finite right peak PI-rings and their indecomposable socle projective modules*, J. Algebra, **134:2**, (1990), 390-468.

Introduction

Representations of 2-equipped posets were introduced in the late 90's.

A. V. Zabarilo & A. G. Zavadskij, *Representations of one-parameter equipped posets*, I, II, Matematychni Studii, **11** (1999), 3–16. In Russian.

A. G. Zavadskij, *Tame equipped posets*, Linear Algebra Appl., **365** (2003), 389–465.

A. G. Zavadskij, *Equipped posets of finite growth*, Representations of Algebras and Related Topics, AMS, Fields Inst. Comm. Ser., **45** (2005), 363–396.

Introduction

Classification of indecomposable corepresentations

There exists a matrix problem of mixed type over an arbitrary quadratic field extension $F \subset G$, in some sense dual to the representation problem.

C. Rodriguez & A. G. Zavadskij, *On corepresentations of equipped posets and their differentiation*, Rev. Col. Mat. **41** (2007), 117-142.

Introduction

Main subjects:

- The criterion of one-parameter type for 2-equipped posets with respect to corepresentations.
- Complete list of all sincere one-parameter 2-equipped posets.
- Classification of all their indecomposable corepresentations.

Main subjects:

- The criterion of one-parameter type for 2-equipped posets with respect to corepresentations.
- Complete list of all sincere one-parameter 2-equipped posets.
- Classification of all their indecomposable corepresentations.

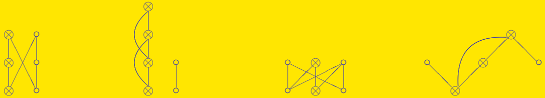
Introduction

Main subjects:

- The criterion of one-parameter type for 2-equipped posets with respect to corepresentations.
- Complete list of all sincere one-parameter 2-equipped posets.
- Classification of all their indecomposable corepresentations.

2-equipped posets

2-equipped poset

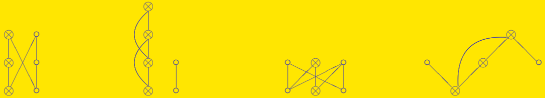


Definition

A 2-equipped poset is a triple $(\mathcal{P}, \leq, \lhd)$

- $(\mathcal{P}, \leq)$ is a poset.
- $\lhd$ is a binary relation over $\mathcal{P}$ called **strong** (no necessarily order relation).
- Condition: $x \leq y \lhd z \quad$ or $\quad x \lhd y \leq z \quad$ implies $x \lhd z$.

2-equipped poset



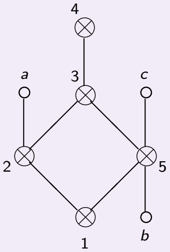
Notation: $x \prec y$ if $x \leq y$ but $x \ntriangleleft y$.

- $x \in \mathcal{P}$ is called **strong** if $x \triangleleft x$. $\circ$
- $x \in \mathcal{P}$ is called **weak** if $x \prec x$. $\otimes$

2-equipped poset

Example

A 2-equipped poset

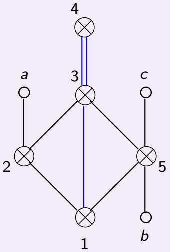


Weak relations: $1 \prec \{2, 3, 4, 5\}$, $2 \prec \{3, 4\}$, $5 \prec \{3, 4\}$ y $3 \prec 4$.
strong relations: $a \triangleright \{1, 2\}$, $c \triangleright \{1, 5, b\}$ furthermore $4 \triangleright \{1, 2, 3, 5, b\}$ and $1 \triangleleft 3$.

2-equipped poset

Example

A 2-equipped poset



Weak relations: $1 \prec \{2, \not{3}, \not{4}, 5\}$, $2 \prec \{3, \not{4}\}$, $5 \prec \{3, \not{4}\}$ y $3 \not\prec 4$.
strong relations: $a \rhd \{1, 2\}$, $c \rhd \{1, 5, b\}$ furthermore
$4 \rhd \{1, 2, 3, 5, b\}$ and $1 \lhd 3$.

Corepresentations of 2-equipped posets

G-hull

The G-hull

Definition

- $F \overset{2}{\subset} G$ quadratic field extension
- U_0 a G-linear space and $X \subset U_0$ a F-linear subspace.

The **G-hull** of X in U_0 is $G(X) = G\,X$.

- $G\,X$: is the G-space spanned by X.
- $$G(X) = \bigcap_{X \subset W} W, \qquad W \text{ is a } G\text{-subspace.}$$

Corepresentations

Invariant form

Definition

A **corepresentation** of $\mathcal{P}$ over (F, G) is any collection

$$U = (U_0,\ U_x\ :\ x \in \mathcal{P})$$

where U_0 is a G-space containing F-spaces U_x such that

$$\begin{aligned} x \leq y \Longrightarrow \quad & U_x \subset U_y\,, \\ x \lhd y \Longrightarrow G(&U_x) \subset U_y\,. \end{aligned}$$

The category of corepresentations

The category corep $\mathcal{P}$ of corepresentations of $\mathcal{P}$

Definition

- **Objects**, are corepresentations of $\mathcal{P}$.
- **Morphism** φ between some objects U and V is a G-linear application $\varphi : U_0 \to V_0$ such that $\varphi U_x \subset V_x$ for $x \in \mathcal{P}$.

U, $V \in$ corep $\mathcal{P}$ are **isomorphic** if there exist an isomorphism $\varphi : U_0 \to V_0$ such that $\varphi U_x = V_x$ for $x \in \mathcal{P}$.

Corepresentations

Matrix form

Matrix corepresentation

Given a poset $\mathcal{P}$, a matrix corepresentation of $\mathcal{P}$ over a quadratic field extension $F \subset G$ is a rectangular matrix M over G separated into vertical stripes M_x ($x \in \mathcal{P}$).

$$M = \begin{array}{|c|c|c|c|c|} \multicolumn{1}{c}{} & \multicolumn{1}{c}{x} & \multicolumn{1}{c}{} & \multicolumn{1}{c}{y} & \multicolumn{1}{c}{} \\ \hline \dots & M_x & \dots & M_y & \dots \\ \hline \end{array}$$

Corepresentations

Matrix form

The admissible transformations of a corepresentation M of $\mathcal{P}$ are the following

- G-elementary row transformations of the whole matrix M.
- $G(F)$-elementary column transformations of M_x stripe if x is strong (weak).
- In case of a weak (strong) relation $x \prec y$ $(x \lhd y)$, there are allowed column additions from the stripe M_x to the stripe M_y with coefficients in $F(G)$.

Corepresentations

Some definitions

Let U, V be corepresentations of a poset $\mathcal{P}$. U and V are equivalent if one can turn into another by means of admissible transformations.

Indecomposable and decomposable corepresentations are naturally defined.

Corepresentations

Some definitions

Let U, V be corepresentations of a poset $\mathcal{P}$. U and V are equivalent if one can turn into another by means of admissible transformations.

Indecomposable and decomposable corepresentations are naturally defined.

The main problem

Corepresentations

The matrix problem over the pair (F, G) consists to classify indecomposable corepresentations up to equivalence.

One-parameter 2-equipped posets

Definitions

Definition

Let M be a matrix corepresentation, its dimension is a vector

$$d = \underline{\dim} M = (d_0; d_x \mid x \in \mathcal{P}) \quad \text{where,}$$

d_0: # of rows in M,
d_x: # of columns in the stripe M_x.

One parameter 2-equipped posets

One-parameter 2-equipped poset

Series

There exists an analogous definition of a matrix corepresentation of a poset $\mathcal{P}$ over the pair of polinomial rings $(F[t], G[t])$.

Series of corepresentations

A series of (F, G)-corepresentations is obtained from $(F[t], G[t])$-corepresentations by substituting any square matrix A over G for the variable t and scalar matrices λI of the same size for the coefficients $\lambda \in G$.

One-parameter 2-equipped posets

Definition

A 2-equipped poset $\mathcal{P}$ of infinite type is one-parameter (in case of infinite fields) if it has a series containing almost all indecomposable corepresentations of each dimension.

Main Results

Main results

One-parameter criterion of 2-equipped posets with respect to corepresentations

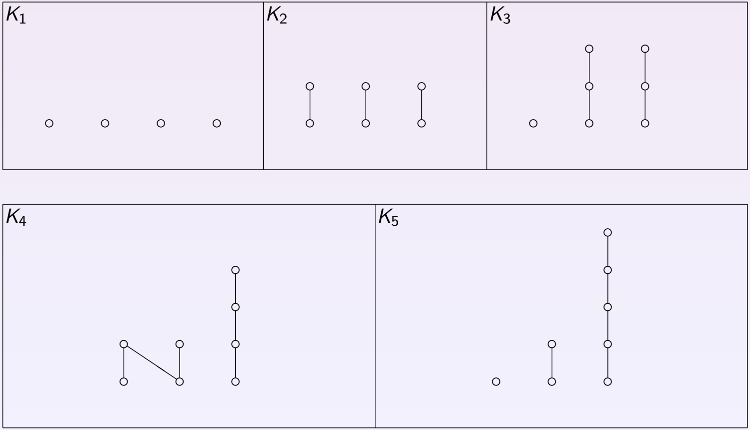
THEOREM 1

Let $\mathcal{P}$ be a 2-equipped poset such that $w(\mathcal{P}) \leq 4$. Then, $\mathcal{P}$ is one parameter if and only if $\mathcal{P}$ contains exactly one critical poset $K_1, \ldots, K_9$ as a subposet.

Main results

The critical posets

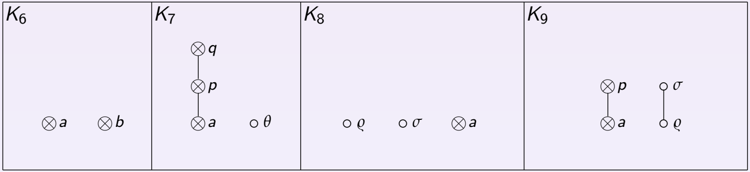
The posets $K_1, \ldots, K_5$ are the **Kleiner's** critical posets.



One-parameter 2-equipped posets

The critical 2-equipped posets

The posets $K_6, \ldots, K_9$ are the 2-equipped critical posets which are not trivially equipped.



Main results

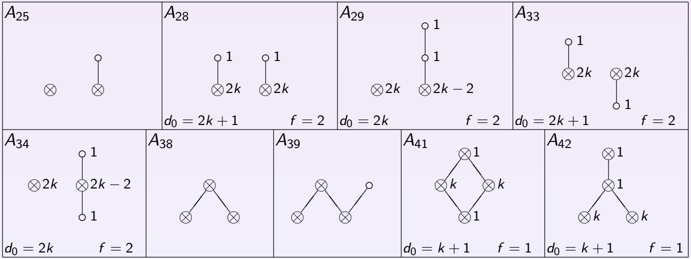
The list of sincere one-parameter 2-equipped poset

THEOREM 2

A non trivially 2-equipped poset $\mathcal{P}$ is one parametric if and only if $\mathcal{P}$ is isomorphic or anti-isomorphic to one of the 28 posets $K_6, \ldots, K_9$, $A_{25}, \ldots, A_{48}$.

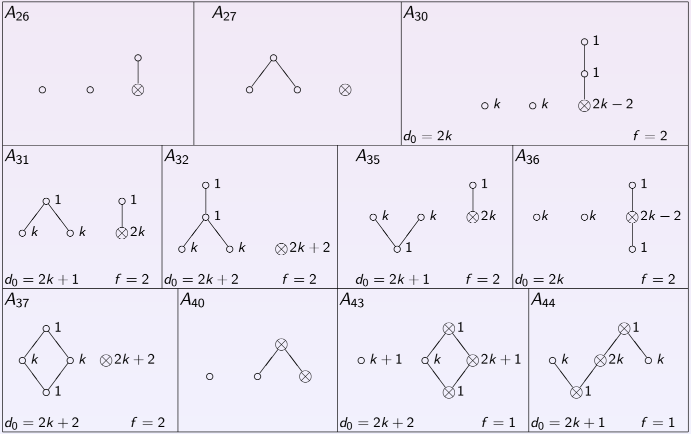
One-parameter 2-equipped posets

The list of one parameter sincere 2-equipped posets containing K_6 except critical and specials



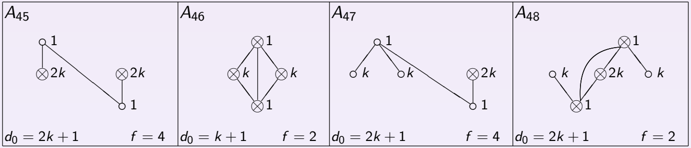
One-parameter 2-equipped posets

The list of one-parameter sincere 2-equipped posets containing K_8 except critical and specials



One-parameter 2-equipped posets

The sincere special 2-equipped posets



Classification of corepresentations

There were described all the sincere indecomposable corepresentations of each one-parameter 2-equipped poset, in an evident matrix form, in particular, the series of corepresentations are describe for the critical 2-equipped posets.

Series of corepresentations of critical 2-equipped posets of one parameter type

Series of corepresentations are reduced to a central homogeneous biquadratic matrix problem over an arbitrary field extension $F \subset F(u) = G$, solved in

A.G. ZAVADSKIJ, *A matrix problem over a central quadratic skew field extension*, Linear Algebra and its Applications, **428** (2008), 393-399.

Main results

Classification of indecomposable corepresentations

C. Rodriguez, *On corepresentations of one parametric equipped posets*, São Paulo J. of Math. Sc. **4**, 2 (2010), 141-175.

Main results

Classification of K_6

tipo	dmin	paso	$f(d)$	A	B	k_1	k_2	k_3	l_1	l_2	l_3
1	1 / 1 2	μ	1	I_n	$\overrightarrow{I}_n + \xi \overleftarrow{I}_n$	0	1	1	0	0	0
1^*	1 / 1 0	μ	1	I_{n+1}	$I_n^{\uparrow} + \xi I_n^{\downarrow}$	0	0	0	0	1	1
2	1 / 2 2	2μ	2	C_{2n+1}	$C_{2n+1} + \overset{\leftleftarrows\downarrow}{I}_{2n}$	1	1	2	0	0	0
2^*	1 / 0 0	2μ	2	$I_{2n}^{\downarrow}$	$I_{2n}^{\downarrow} + C_{2n-1}^{\uparrow\uparrow}$	0	0	0	1	1	2
$3 = \widetilde{3}^*$	1 / 2 0	2μ	2	$\overrightarrow{I}_{2n+1} + \xi \overleftarrow{I}_{2n+1}$	$I_{2n}^{\uparrow}$	1	0	0	0	1	0
$4 = 4^*$	2 / 2 2	2μ	0	P_{2n}	$R_{2n}^{\uparrow}$	0	1	0	0	1	0
$5 = 5^*$	1 / 1 1	μ	0	I_n	$I_n + \xi J_n^{+}(0)$	0	0	1	0	0	1
$6 = 6^*$	1 / 1 1	μ	0	I_n	$\xi I_n + X$	0	0	0	0	0	0

Remark

The X block represent an indecomposable Frobenius block over F.

Main results

Example $(K_6 - 1^*)$

$$\left[\begin{array}{cc|c} 1 & & \xi \\ & 1 & 1 \end{array}\right], \quad \left[\begin{array}{ccc|cc} 1 & & & \xi & \\ & 1 & & 1 & \xi \\ & & 1 & & 1 \end{array}\right], \quad \left[\begin{array}{cccc|ccc} 1 & & & & \xi & & \\ & 1 & & & 1 & \xi & \\ & & 1 & & & 1 & \xi \\ & & & 1 & & & 1 \end{array}\right], \ldots$$

${}_2(K_6 - 1^*)$ — $d = (2, 2, 1)$

${}_3(K_6 - 1^*)$ — $d = (3, 3, 2)$

${}_4(K_6 - 1^*)$ — $d = (4, 4, 3)$

Main results

Example of the series of K_6 for the case $(\mathbb{R}, \mathbb{C})$: $\begin{array}{|c|c|}\hline I_n & iI_n + X \\ \hline\end{array}$, where X is an indecomposable Fröbenius block.

For $d = (1,1,1)$

$\begin{array}{|c|c|}\hline 1 & i+2 \\ \hline\end{array}$, $\begin{array}{|c|c|}\hline 1 & i+3 \\ \hline\end{array}$, $\begin{array}{|c|c|}\hline 1 & i+4 \\ \hline\end{array}$, ...

For $d = (2,2,2)$

$\begin{array}{|cc|cc|}\hline 1 & & i & -3 \\ & 1 & 1 & i \\ \hline\end{array}$, $\begin{array}{|cc|cc|}\hline 1 & & i & -1 \\ & 1 & 1 & i\text{-}1 \\ \hline\end{array}$, $\begin{array}{|cc|cc|}\hline 1 & & i & -2 \\ & 1 & 1 & i\text{-}1 \\ \hline\end{array}$, ...

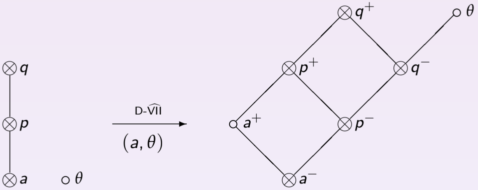
Main results

Classification of K_7

$(K_7-1) = \text{Int}\,(K_6-1)$	$(K_7-1^*) = \text{Int}\,(K_6-1^*)$
$(K_7-2) = \text{Int}\,(K_6-\widetilde{1})$	$(K_7-2^*) = \text{Int}\,(K_6-\widetilde{1}^*)$
$(K_7-3) = \text{Int}\,(A_{38}-1)$	$(K_7-3^*) = \text{Int}\,(A_{38^*}-1)$
$(K_7-4) = \text{Int}\,(A_{38}-2)$	$(K_7-4^*) = \text{Int}\,(A_{38^*}-2)$
$(K_7-5) = \text{Int}\,(A_{38}-\widetilde{2})$	$(K_7-5^*) = \text{Int}\,(A_{38^*}-\widetilde{2})$
$(K_7-6) = \text{Int}\,(A_{38}-3)$	$(K_7-6^*) = \text{Int}\,(A_{38^*}-3)$
$(K_7-7) = \text{Int}\,(A_{25}-1)$	$(K_7-7^*) = \text{Int}\,(A_{25^*}-1)$
$(K_7-8) = \text{Int}\,(A_{39}-1)$	$(K_7-8^*) = \text{Int}\,(A_{39^*}-1)$
$(K_7-9) = \text{Int}\,(A_{39}-2)$	$(K_7-9^*) = \text{Int}\,(A_{39^*}-2)$
$(K_7-10) = \text{Int}\,(A_{39}-3)$	$(K_7-10^*) = \text{Int}\,(A_{39^*}-3)$
$(K_7-11) = \text{Int}\,(A_{39}-4)$	$(K_7-11^*) = \text{Int}\,(A_{39^*}-4)$
$(K_7-12) = \text{Int}\,(A_{39}-5)$	$(K_7-12^*) = \text{Int}\,(A_{39^*}-5)$

$(K_7-13) = \text{Int}\,(K_6-2)$	$(K_7-13^*) = \text{Int}\,(K_6-2^*)$
$(K_7-14) = \text{Int}\,(K_6-3)$	$(K_7-14^*) = \text{Int}\,(K_6-3^*)$
$(K_7-15) = \text{Int}\,(A_{38}-4)$	$(K_7-15^*) = \text{Int}\,(A_{38^*}-4)$
$(K_7-16) = \text{Int}\,(A_{25}-2)$	$(K_7-16^*) = \text{Int}\,(A_{25^*}-2)$
$(K_7-17) = \text{Int}\,(A_{25}-3)$	$(K_7-17^*) = \text{Int}\,(A_{25^*}-3)$
$(K_7-18) = \text{Int}\,(A_{25}-4)$	$(K_7-18^*) = \text{Int}\,(A_{25^*}-4)$
$(K_7-19) = \text{Int}\,(A_{39}-6)$	$(K_7-19^*) = \text{Int}\,(A_{39^*}-6)$
$(K_7-20) = \text{Int}\,(A_{39}-7)$	$(K_7-20^*) = \text{Int}\,(A_{39^*}-7)$
$(K_7-21) = \text{Int}\,(A_{39}-8)$	$(K_7-21^*) = \text{Int}\,(A_{39^*}-8)$
$(K_7-22) = \text{Int}\,(A_{39}-9)$	$(K_7-22^*) = \text{Int}\,(A_{39^*}-9)$
$(K_7-23) = \text{Int}\,(A_{39}-10)$	$(K_7-23^*) = \text{Int}\,(A_{39^*}-10)$
$(K_7-24) = \text{Int}\,(K_6-4)$	
$(K_7-25) = \text{Int}\,(A_{33})$	

The serie of K_7



The serie

a	p	q	θ
I_n	X	I_n	I_n
I_n	ξI_n		

where X is an indecomposable Frobenius block over F.

Main results

Classification of indecomposable corepresentations of K_8

M_U has the matrix
$$\begin{array}{c|c|cc} \varrho & \sigma & \multicolumn{2}{c}{\text{a}} \\ \hline R & 0 & A_1 & A_2 \\ 0 & S & A_1' & A_2' \end{array}$$

tipo	dmin	paso	$f(d)$	R	A_1	A_2	S	A_1'	A_2'
1	$^{2}\ 1\ 1\ 3$	μ	1	I_n	$\overrightarrow{I_n}$	ξI_n	I_n	$\overleftarrow{I_n}$	ξI_n
1^*	$^{2}\ 1\ 1\ 1$	μ	1	I_{n+1}	$I_n^{\downarrow}$	ξI_{n+1}	I_{n+1}	$I_n^{\uparrow}$	ξI_{n+1}
$2 = \tilde{2}^*$	$^{1}\ 1\ 0\ 1$	μ	1	I_{n+1}	I_{n+1}	$\xi I_n^{\uparrow}$	I_n	$\overrightarrow{I_n}$	ξI_n
3	$^{1}\ 1\ 0\ 2$	μ	2	I_{n+1}	I_{n+1}	ξI_{n+1}	I_n	$\overrightarrow{I_n}$	$\xi \overleftarrow{I_n}$
3^*	$^{1}\ 0\ 1\ 0$	μ	2	I_n	I_n	ξI_n	I_{n+1}	$I_n^{\uparrow}$	$\xi I_n^{\downarrow}$
$4 = 4^*$	$^{2}\ 1\ 1\ 2$	μ	0	I_n	I_n	$\xi J_n(0)$	I_n	I_n	ξI_n
$5 = 5^*$	$^{2}\ 1\ 1\ 2$	μ	0	I_n	I_n	$\xi J_n(1)$	I_n	I_n	ξI_n
6_i	$^{2}\ 1\ 1\ 2$	μ	0	I_n	I_n	ξI_n	I_n	$[I_n - \overline{C(f)}]$	$\xi[I_n + \overline{C(f)}]$
6_{ii}	$^{2}\ 1\ 1\ 2$	μ	0	I_n	I_n	ξI_n	I_n	$[I_n + \overline{C(f)}]$	$[\bar{\xi} I_n + \xi \overline{C(f)}]$
6_{iii}	$^{2}\ 1\ 1\ 2$	μ	0	I_n	I_n	ξI_n	I_n	$[\overline{C(f)}]$	$\xi[I_n + C(f)]$

Main results

Classification of indecomposable corepresentations of K_8

M_U has the matrix form

$$\begin{array}{c|c|cc} \varrho & \sigma & \multicolumn{2}{c}{a} \\ \hline 1\,0\ldots 0 & 1\,0\ldots 0 & T_1 & T_2 \\ \hline R & 0 & A_1 & A_2 \\ 0 & S & A_1' & A_2' \end{array}$$

tipo	dmin	paso	$f(d)$	R	A_1	A_2	S	A_1'	A_2'	T_1	T_2
7	$^{1}\ 1\ 1\ 1$	μ	1	$\overleftarrow{I_n}$	$\overrightarrow{I_n}$	ξI_n	$\overleftarrow{I_n}$	$\overleftarrow{I_n}$	ξI_n	$0\,0\ldots 0$	$1\,0\ldots 0$
8	$^{1}\ 1\ 1\ 2$	μ	2	$\overleftarrow{I_n}$	$\overrightarrow{I_n}$	$\xi\overleftarrow{I_n}$	$\overleftarrow{I_n}$	$\overleftarrow{I_n}$	$\xi\overrightarrow{I_n}$	$0\ldots 0\,1$	$0\ldots 0\,\xi$
9	$^{2}\ 1\ 2\ 2$	μ	2	$\overleftarrow{I_n}$	$\overrightarrow{I_n}$	$\xi\overleftarrow{I_n}$	$\overleftarrow{I_{n+1}}$	I_{n+1}	ξI_{n+1}	$0\,0\ldots 0$	$1\,0\ldots 0$
10	$^{1}\ 1\ 1\ 0$	μ	2	$\overleftarrow{I_n}$	I_n	$\xi J_n(1)$	$\overleftarrow{I_n}$	I_n	ξI_n	$0\,0\ldots 0$	$1\,0\ldots 0$

M_U has the matrix form

$$\begin{array}{c|c|cc} \varrho & \sigma & \multicolumn{2}{c}{a} \\ \hline R & 0 & A_1 & A_2 \\ 0 & S & A_1' & A_2' \\ \hline 0\,0\ldots 0 & 0\,0\ldots 0 & L_1 & L_2 \end{array}$$

tipo	dmin	paso	$f(d)$	R	A_1	A_2	S	A_1'	A_2'	L_1	L_2
7^*	$^{1}\ 0\ 0\ 1$	μ	1	I_n	I_n	$\xi\overleftarrow{I_n}$	I_n	I_n	$\xi\overrightarrow{I_n}$	$1\ldots 1\,1$	$\xi\ \ldots\ \xi\ \xi$
8^*	$^{1}\ 0\ 0\ 0$	μ	2	I_n	$J_n(0)$	ξI_n	I_n	I_n	$\xi J_n(0)$	$1\ldots 1\,1$	$\xi\ \ldots\ \xi\ \xi$
9^*	$^{2}\ 1\ 0\ 2$	μ	2	I_{n+1}	I_{n+1}	$\xi J_{n+1}(0)$	I_n	$\overleftarrow{I_n}$	$\xi\overleftarrow{I_n}$	$1\ldots 1\,1$	$\xi\ \ldots\ \xi\ \xi$
10^*	$^{1}\ 0\ 0\ 2$	μ	2	I_n	$\overrightarrow{I_n}$	$\xi\overrightarrow{I_n}+\xi\overleftarrow{I_n}$	I_n	$\overrightarrow{I_n}$	$\xi\overrightarrow{I_n}$	$0\ldots 0\,1$	$0\ldots 0\,\xi$

tipo
$K_8 - 11 = 11^*$

$$M_U \leftrightarrow \begin{array}{c|c|cc} \varrho & \sigma & \multicolumn{2}{c}{a} \\ \hline I_n & I_n & 0 & \xi I_n \\ J_n^+(0) & 0 & I_n & \xi I_n \end{array}$$

dmin : $^{2}\ 1\ 1\ 2$
paso μ
$f(d) = 0$

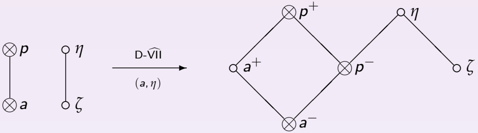
Main results

Classification of indecomposable corepresentations of K_9

(K_9-1)	$=$	$\text{Int}\ (K_8-1)$	(K_9-1^*)	$=$	$\text{Int}\ (A_{40}-6)$
(K_9-2)	$=$	$\text{Int}\ (K_8-1^*)$	(K_9-2^*)	$=$	$\text{Int}\ (A_{40^*}-6)$
(K_9-3)	$=$	$\text{Int}\ (K_8-2)$	(K_9-3^*)	$=$	$\text{Int}\ (A_{40^*}-3)$
(K_9-4)	$=$	$\text{Int}\ (K_8-2^*)$	(K_9-4^*)	$=$	$\text{Int}\ (A_{40}-3)$
(K_9-5)	$=$	$\text{Int}\ (K_8-7)$	(K_9-5^*)	$=$	$\text{Int}\ (A_{40}-1)$
(K_9-6)	$=$	$\text{Int}\ (K_8-7^*)$	(K_9-6^*)	$=$	$\text{Int}\ (A_{40^*}-1)$
(K_9-7)	$=$	$\text{Int}\ (A_{40}-2)$	(K_9-7^*)	$=$	$\text{Int}\ (A_{40^*}-7)$
(K_9-8)	$=$	$\text{Int}\ (A_{40}-7)$	(K_9-8^*)	$=$	$\text{Int}\ (A_{40^*}-2)$
(K_9-9)	$=$	$\text{Int}\ (A_{40}-11)$	(K_9-9^*)	$=$	$\text{Int}\ (A_{40^*}-13)$
(K_9-10)	$=$	$\text{Int}\ (A_{40}-12)$	(K_9-10^*)	$=$	$\text{Int}\ (A_{40^*}-11)$
(K_9-11)	$=$	$\text{Int}\ (A_{40}-13)$	(K_9-11^*)	$=$	$\text{Int}\ (A_{40^*}-12)$
(K_9-12)	$=$	$\text{Int}\ (A_{40}-5)$			
(K_9-13)	$=$	$\text{Int}\ (A_{40^*}-5)$			

(K_9-14)	$=$	$\text{Int}\ (K_8-3)$	(K_9-14^*)	$=$	$\text{Int}\ (K_8-\widetilde{9}^*)$
(K_9-15)	$=$	$\text{Int}\ (K_8-3^*)$	(K_9-15^*)	$=$	$\text{Int}\ (K_8-\widetilde{9})$
(K_9-16)	$=$	$\text{Int}\ (K_8-\widetilde{3})$	(K_9-16^*)	$=$	$\text{Int}\ (A_{40}-10)$
(K_9-17)	$=$	$\text{Int}\ (K_8-\widetilde{3}^*)$	(K_9-17^*)	$=$	$\text{Int}\ (A_{40^*}-10)$
(K_9-18)	$=$	$\text{Int}\ (K_8-8)$	(K_9-18^*)	$=$	$\text{Int}\ (A_{40}-8)$
(K_9-19)	$=$	$\text{Int}\ (K_8-8^*)$	(K_9-19^*)	$=$	$\text{Int}\ (A_{40^*}-8)$
(K_9-20)	$=$	$\text{Int}\ (K_8-9)$	(K_9-20^*)	$=$	$\text{Int}\ (A_{40}-4)$
(K_9-21)	$=$	$\text{Int}\ (K_8-9^*)$	(K_9-21^*)	$=$	$\text{Int}\ (A_{40^*}-4)$
(K_9-22)	$=$	$\text{Int}\ (A_{40}-9)$	(K_9-22^*)	$=$	$\text{Int}\ (A_{40^*}-9)$
(K_9-23)	$=$	$\text{Int}\ (A_{40}-14)$	(K_9-23^*)	$=$	$\text{Int}\ (A_{40^*}-15)$
(K_9-24)	$=$	$\text{Int}\ (A_{40}-15)$	(K_9-24^*)	$=$	$\text{Int}\ (A_{40^*}-14)$
(K_9-25)	$=$	$\text{Int}\ (K_8-10)$			
(K_9-26)	$=$	$\text{Int}\ (K_8-10^*)$			

The serie of K_9



The serie

a		p		ζ	η
		A	B	I_n	
	I_n	I_n	ξI_n		I_n
I_n	ξI_n				

$A = [I_n - \overline{C(f)}]$ and $B = \xi[I_n + \overline{C(f)}]$, if $F \subset G$ is separable and $car \neq 2$;

$A = [I_n + \overline{C(f)}]$ and $B = [\bar{\xi} I_n + \xi\overline{C(f)}]$, if $F \subset G$ separable and $car = 2$;

$A = [\overline{C(f)}]$ and $B = \xi[I_n + C(f)]$, if $F \subset G$ is inseparable.

Thanks