

МОДЕЛИРОВАНИЕ И УПРАВЛЕНИЕ В ТЕХНИЧЕСКИХ СИСТЕМАХ

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Экспериментальное определение коэффициентов восьмиполюсника с пятью входными и тремя выходными выводами

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Experimental determination of the coefficients of an eight-pole network with five input and three output pins

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A number of electrical objects, namely, some electrical installations, parts of electrical circuits or electrical systems, may be replaced by passive eight poles, in particular, eight poles with five input and three output pins. Such a substitution will significantly simplify the analysis of the features of the functioning of these objects, especially when only the input and output characteristics of electrical energy are of interest. Features of the state of the eight-port network are described by equations of various forms. To describe the state of an eight-port network with five input and three output outputs in power engineering, the B-form equations are most often used. To implement these equations, it is necessary to have information about the numerical values of the corresponding coefficients. The article presents one of the possible options for the experimental determination of these coefficients. For the experimental determination of the numerical values of the coefficients of the B-form equations describing the state of the eight-terminal network with five input and three output outputs, eight experiments are required. The numerical values of these coefficients will allow us to determine the numerical values of the coefficients of equations of other forms describing the state of the same eight-terminal network. Information on the numerical values of the eight-pole coefficients will allow establishing a quantitative relationship between the input and output characteristics of electrical energy.

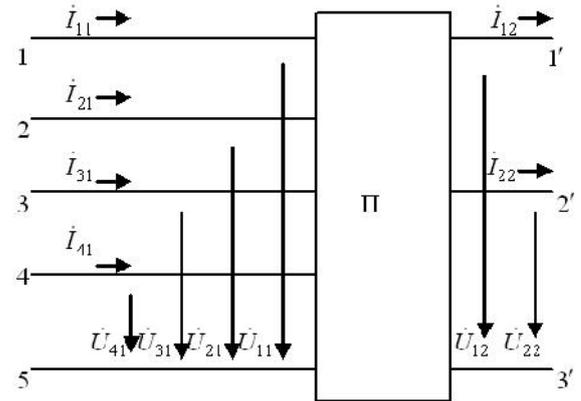
Keywords: eight-pole; eight-port coefficients; experiment scheme; voltage; currents; idle experience; short circuit experience; voltmeter; ammeter; phase meter.

[5],
[6-8], [9],
[11; 12].

[1; 2].

[3; 4].

[10]



. 1.

$$\left. \begin{aligned} \dot{U}_{12} &= B_{11}\dot{U}_{11} + B_{12}\dot{I}_{11} + B_{13}\dot{U}_{21} + B_{14}\dot{I}_{21} + \\ &\quad + B_{15}\dot{U}_{31} + B_{16}\dot{I}_{31} + B_{17}\dot{U}_{41} + B_{18}\dot{I}_{41}; \\ \dot{U}_{22} &= B_{21}\dot{U}_{11} + B_{22}\dot{I}_{11} + B_{23}\dot{U}_{21} + B_{24}\dot{I}_{21} + \\ &\quad + B_{25}\dot{U}_{31} + B_{26}\dot{I}_{31} + B_{27}\dot{U}_{41} + B_{28}\dot{I}_{41}; \\ \dot{I}_{12} &= B_{31}\dot{U}_{11} + B_{32}\dot{I}_{11} + B_{33}\dot{U}_{21} + B_{34}\dot{I}_{21} + \\ &\quad + B_{35}\dot{U}_{31} + B_{36}\dot{I}_{31} + B_{37}\dot{U}_{41} + B_{38}\dot{I}_{41}; \\ \dot{I}_{22} &= B_{41}\dot{U}_{11} + B_{42}\dot{I}_{11} + B_{43}\dot{U}_{21} + B_{44}\dot{I}_{21} + \\ &\quad + B_{45}\dot{U}_{31} + B_{46}\dot{I}_{31} + B_{47}\dot{U}_{41} + B_{48}\dot{I}_{41}, \end{aligned} \right\} (1)$$

$B_{11}, B_{12}, B_{13}, B_{14}, B_{15}, B_{16}, B_{17}, B_{18}, B_{21}, B_{22}, B_{23}, B_{24}, B_{25}, B_{26}, B_{27}, B_{28}, B_{31}, B_{32}, B_{33}, B_{34}, B_{35}, B_{36}, B_{37}, B_{38}, B_{41}, B_{42}, B_{43}, B_{44}, B_{45}, B_{46}, B_{47}, B_{48}$ —

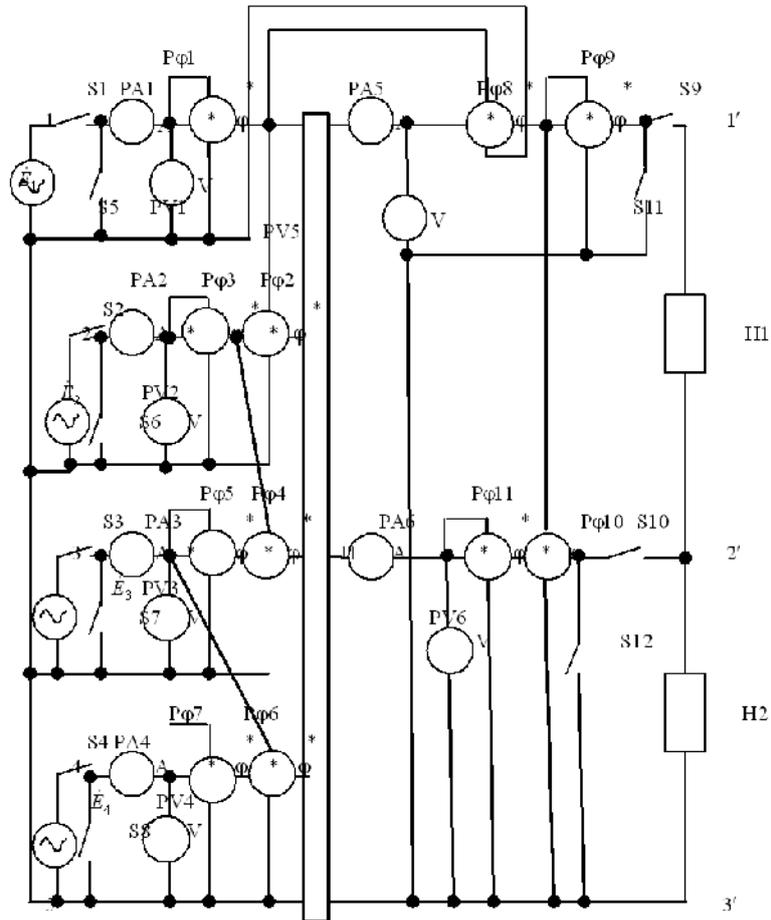
(. 1).

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[13]:

$\dot{E}_2, \dot{E}_3, \dot{E}_4,$
 $P\varphi 1 - P\varphi 11$
 $S1 - S12,$
 $\dot{E}_1,$
 $PV1 - PV6,$
 $1 - 6,$
 $\dot{U}_{11} : \varphi_{u11} = 0.$



. 2.

$$\begin{array}{l}
 \dot{E}_1 \\
 1 \quad 2. \quad 2, 3 \quad 4 \\
 \text{S1.} \\
 i_{21}^{(1)}, i_{31}^{(1)}, i_{41}^{(1)} \quad i_{12}^{(1)} \quad i_{22}^{(1)} : \\
 i_{21}^{(1)} = i_{31}^{(1)} = i_{41}^{(1)} = i_{12}^{(1)} = i_{22}^{(1)} = 0. \\
 i_{11}^{(1)} \quad 2 - 6. \\
 1, \quad \dot{U}_{11}^{(1)}, \dot{U}_{21}^{(1)}, \dot{U}_{31}^{(1)} \\
 \dot{U}_{41}^{(1)} - \text{PV1, PV2, PV3} \quad \text{PV4.} \\
 \text{P}\phi 1 \\
 \dot{U}_{11}^{(1)} \quad i_{11}^{(1)} : \\
 \phi_1 = \phi_{u11} - \phi_{i11}. \\
 \dot{U}_{11}^{(1)} \quad \phi_{u11} \\
 : \phi_{i11} = \phi_{u11} - \phi_1. \\
 \dot{U}_{21}^{(1)}, \dot{U}_{31}^{(1)} \quad \dot{U}_{41}^{(1)}, \\
 \text{P}\phi 3, \text{P}\phi 5 \quad \text{P}\phi 7 \\
 1. \\
 \text{P}\phi 3 - \\
 \dot{U}_{21}^{(1)} \quad i_{11}^{(1)} : \phi_3 = \phi_{u21} - \phi_{i11}; \quad \text{P}\phi 5 - \\
 \dot{U}_{31}^{(1)} \\
 i_{11}^{(1)} : \phi_5 = \phi_{u31} - \phi_{i11}; \quad \text{P}\phi 7 - \\
 \dot{U}_{41}^{(1)} \quad i_{11}^{(1)} : \\
 \phi_7 = \phi_{u41} - \phi_{i11}. \\
 : \quad \phi_{u21} = \phi_3 + \phi_{i11}; \quad \phi_{u31} = \phi_5 + \phi_{i11}; \\
 \phi_{u41} = \phi_7 + \phi_{i11}. \\
 : \\
 \dot{U}_{11}^{(1)} = U_{11}^{(1)} e^{j\phi_{u11}}; \quad \dot{U}_{21}^{(1)} = U_{21}^{(1)} e^{j\phi_{u21}}; \quad \dot{U}_{31}^{(1)} = U_{31}^{(1)} e^{j\phi_{u31}}; \\
 \dot{U}_{41}^{(1)} = U_{41}^{(1)} e^{j\phi_{u41}}; \quad i_{11}^{(1)} = I_{11}^{(1)} e^{j\phi_{i11}}. \\
 \dot{U}_{12}^{(1)} \quad \dot{U}_{22}^{(1)} \\
 \text{PV5} \quad \text{PV6} \\
 \text{P}\phi 9 \quad \text{P}\phi 11 \\
 1. \\
 : \quad \text{P}\phi 9 - \\
 \dot{U}_{12}^{(1)} \\
 i_{11}^{(1)} : \phi_9 = \phi_{u12} - \phi_{i11}; \quad \text{P}\phi 11 - \\
 \dot{U}_{22}^{(1)} \\
 i_{11}^{(1)} : \phi_{11} = \phi_{u22} - \phi_{i11}. \\
 \dot{U}_{12}^{(1)} \quad \dot{U}_{22}^{(1)} \\
 : \phi_{u12} = \phi_9 + \phi_{i11}; \quad \phi_{u22} = \phi_{11} + \phi_{i11}. \\
 \dot{U}_{12}^{(1)} = U_{12}^{(1)} e^{j\phi_{u12}}; \\
 \dot{U}_{22}^{(1)} = U_{22}^{(1)} e^{j\phi_{u22}}; \\
 \dot{U}_{12}^{(1)} = B_{11}\dot{U}_{11}^{(1)} + B_{12}i_{11}^{(1)} + B_{13}\dot{U}_{21}^{(1)} + B_{15}\dot{U}_{31}^{(1)} + B_{17}\dot{U}_{41}^{(1)}; \\
 \dot{U}_{22}^{(1)} = B_{21}\dot{U}_{11}^{(1)} + B_{22}i_{11}^{(1)} + B_{23}\dot{U}_{21}^{(1)} + B_{25}\dot{U}_{31}^{(1)} + B_{27}\dot{U}_{41}^{(1)}; \\
 0 = B_{31}\dot{U}_{11}^{(1)} + B_{32}i_{11}^{(1)} + B_{33}\dot{U}_{21}^{(1)} + B_{35}\dot{U}_{31}^{(1)} + B_{37}\dot{U}_{41}^{(1)}; \\
 0 = B_{41}\dot{U}_{11}^{(1)} + B_{42}i_{11}^{(1)} + B_{43}\dot{U}_{21}^{(1)} + B_{45}\dot{U}_{31}^{(1)} + B_{47}\dot{U}_{41}^{(1)}. \\
 \dot{U}_{12}^{(2)} = U_{12}^{(2)} e^{j\phi_{u12}}; \\
 \dot{U}_{22}^{(2)} = U_{22}^{(2)} e^{j\phi_{u22}}; \\
 i_{21}^{(2)}, i_{31}^{(2)}, i_{41}^{(2)}, \\
 \dot{U}_{22}^{(2)} : \\
 i_{12}^{(2)} = i_{31}^{(2)} = i_{41}^{(2)} = i_{12}^{(2)} = 0; \quad \dot{U}_{22}^{(2)} = 0. \\
 2 \\
 5 \quad \text{V6.} \\
 \dot{U}_{11}^{(2)}, \dot{U}_{21}^{(2)}, \dot{U}_{31}^{(2)}, \dot{U}_{41}^{(2)} \quad i_{11}^{(2)} \\
 \dot{U}_{12}^{(2)} \\
 \text{V5,} \quad i_{22}^{(2)} - \\
 6. \\
 \text{P}\phi 9 \\
 1, \\
 i_{11}^{(2)} : \phi_9 = \phi_{u12} - \phi_{i11}. \\
 : \\
 \phi_{u12} = \phi_9 + \phi_{i11}. \\
 \text{P}\phi 10 \\
 \dot{U}_{12}^{(2)} \quad i_{22}^{(2)} : \\
 \phi_{10} = \phi_{u12} - \phi_{i22}. \\
 i_{22}^{(2)} : \phi_{i22} = \phi_{u12} - \phi_{10}. \\
 : \\
 \dot{U}_{12}^{(2)} = U_{12}^{(2)} e^{j\phi_{u12}}; \quad i_{22}^{(2)} = I_{22}^{(2)} e^{j\phi_{i22}}. \\
 \dot{U}_{12}^{(2)} = B_{11}\dot{U}_{11}^{(2)} + B_{12}i_{11}^{(2)} + B_{13}\dot{U}_{21}^{(2)} + B_{15}\dot{U}_{31}^{(2)} + B_{17}\dot{U}_{41}^{(2)}; \\
 0 = B_{21}\dot{U}_{11}^{(2)} + B_{22}i_{11}^{(2)} + B_{23}\dot{U}_{21}^{(2)} + B_{25}\dot{U}_{31}^{(2)} + B_{27}\dot{U}_{41}^{(2)}; \\
 0 = B_{31}\dot{U}_{11}^{(2)} + B_{32}i_{11}^{(2)} + B_{33}\dot{U}_{21}^{(2)} + B_{35}\dot{U}_{31}^{(2)} + B_{37}\dot{U}_{41}^{(2)}; \\
 i_{22}^{(2)} = B_{41}\dot{U}_{11}^{(2)} + B_{42}i_{11}^{(2)} + B_{43}\dot{U}_{21}^{(2)} + B_{45}\dot{U}_{31}^{(2)} + B_{47}\dot{U}_{41}^{(2)}. \\
 \end{array}$$

$$\begin{array}{l}
 \dot{E}_1, \quad 2, \quad 5, \quad 1, \quad 2, \quad 3, \quad 4 \\
 \text{S2 - S5, S7 - S12} \quad \text{S1, S6.} \\
 \dot{U}_{21}^{(3)} = 0; \quad \dot{I}_{31}^{(3)} = \dot{I}_{41}^{(3)} = \dot{I}_{12}^{(3)} = \dot{I}_{22}^{(3)} = 0. \\
 \text{PV2} \\
 \dot{U}_{11}^{(3)}, \quad \dot{U}_{31}^{(3)}, \quad \dot{U}_{41}^{(3)} \\
 \text{PV1, PV3} \quad \text{PV4,} \\
 \dot{I}_{11}^{(3)}, \quad \dot{I}_{21}^{(3)} \\
 \text{P}\phi 1 \\
 \dot{U}_{11}^{(3)} \quad \dot{I}_{11}^{(3)} : \Phi_1 = \Phi_{u11} - \Phi_{i11}. \\
 \dot{U}_{11}^{(3)} \quad \dot{I}_{11}^{(3)} \\
 : \Phi_{i11} = \Phi_{u11} - \Phi_1. \\
 \text{P}\phi 2 \\
 \dot{U}_{11}^{(3)} \quad \dot{I}_{21}^{(3)} : \Phi_2 = \Phi_{u11} - \Phi_{i21}. \\
 \dot{I}_{21}^{(3)} \\
 : \Phi_{i21} = \Phi_{u11} - \Phi_2. \\
 \dot{U}_{31}^{(3)} \quad \dot{U}_{41}^{(3)} \\
 \text{P}\phi 5 \quad \text{P}\phi 7 \\
 \text{P}\phi 5 - \\
 \dot{U}_{31}^{(3)} \quad \dot{I}_{21}^{(3)} : \Phi_5 = \Phi_{u31} - \Phi_{i21}; \quad \text{P}\phi 7 - \\
 \dot{U}_{41}^{(3)} \\
 \dot{I}_{21}^{(3)} : \Phi_7 = \Phi_{u41} - \Phi_{i21}, \\
 : \Phi_{u31} = \Phi_5 + \Phi_{i21}; \\
 \Phi_{u41} = \Phi_7 + \Phi_{i21}. \\
 \dot{U}_{11}^{(3)} = U_{11}^{(3)} e^{j\Phi_{u11}}; \quad \dot{U}_{31}^{(3)} = U_{31}^{(3)} e^{j\Phi_{u31}}; \quad \dot{U}_{41}^{(3)} = U_{41}^{(3)} e^{j\Phi_{u41}}; \\
 \dot{I}_{11}^{(3)} = I_{11}^{(3)} e^{j\Phi_{i11}}; \quad \dot{I}_{21}^{(3)} = I_{21}^{(3)} e^{j\Phi_{i21}}. \\
 \dot{U}_{12}^{(3)} \quad \dot{U}_{22}^{(3)} \\
 \Phi_9 = \Phi_{u12} - \Phi_{i11}. \\
 (1) \\
 \left. \begin{array}{l} \dot{U}_{12}^{(3)} = B_{11}\dot{U}_{11}^{(3)} + B_{12}\dot{I}_{11}^{(3)} + B_{14}\dot{I}_{21}^{(3)} + B_{15}\dot{U}_{31}^{(3)} + B_{17}\dot{U}_{41}^{(3)}; \\ \dot{U}_{22}^{(3)} = B_{21}\dot{U}_{11}^{(3)} + B_{22}\dot{I}_{11}^{(3)} + B_{24}\dot{I}_{21}^{(3)} + B_{25}\dot{U}_{31}^{(3)} + B_{27}\dot{U}_{41}^{(3)}; \\ 0 = B_{31}\dot{U}_{11}^{(3)} + B_{32}\dot{I}_{11}^{(3)} + B_{34}\dot{I}_{21}^{(3)} + B_{35}\dot{U}_{31}^{(3)} + B_{37}\dot{U}_{41}^{(3)}; \\ 0 = B_{41}\dot{U}_{11}^{(3)} + B_{42}\dot{I}_{11}^{(3)} + B_{44}\dot{I}_{21}^{(3)} + B_{45}\dot{U}_{31}^{(3)} + B_{47}\dot{U}_{41}^{(3)}. \end{array} \right\} (4)
 \end{array}$$

$$\begin{array}{l}
 \dot{E}_1, \quad 2, \quad 5, \quad 3, \quad 4 \\
 \text{S2 - S5, S7 - S11} \\
 \text{S1, S6, S12.} \\
 \dot{U}_{21}^{(4)}, \\
 \dot{U}_{22}^{(4)} : \dot{U}_{21}^{(4)} = \dot{U}_{22}^{(4)} = 0; \quad \dot{I}_{31}^{(4)} = \dot{I}_{41}^{(4)} = \dot{I}_{12}^{(4)} = 0. \\
 \text{V2, V6} \\
 \dot{U}_{11}^{(4)}, \quad \dot{U}_{31}^{(4)}, \quad \dot{U}_{41}^{(4)} \\
 \dot{I}_{11}^{(4)}, \quad \dot{I}_{21}^{(4)} \\
 \dot{U}_{12}^{(4)} \\
 (1) \\
 \left. \begin{array}{l} \dot{U}_{12}^{(4)} = B_{11}\dot{U}_{11}^{(4)} + B_{12}\dot{I}_{11}^{(4)} + B_{14}\dot{I}_{21}^{(4)} + B_{15}\dot{U}_{31}^{(4)} + B_{17}\dot{U}_{41}^{(4)}; \\ 0 = B_{21}\dot{U}_{11}^{(4)} + B_{22}\dot{I}_{11}^{(4)} + B_{24}\dot{I}_{21}^{(4)} + B_{25}\dot{U}_{31}^{(4)} + B_{27}\dot{U}_{41}^{(4)}; \\ 0 = B_{31}\dot{U}_{11}^{(4)} + B_{32}\dot{I}_{11}^{(4)} + B_{34}\dot{I}_{21}^{(4)} + B_{35}\dot{U}_{31}^{(4)} + B_{37}\dot{U}_{41}^{(4)}; \\ \dot{I}_{22}^{(4)} = B_{41}\dot{U}_{11}^{(4)} + B_{42}\dot{I}_{11}^{(4)} + B_{44}\dot{I}_{21}^{(4)} + B_{45}\dot{U}_{31}^{(4)} + B_{47}\dot{U}_{41}^{(4)} \end{array} \right\} (5)
 \end{array}$$

Pφ4

$$\dot{U}_{21}^{(5)} \quad \dot{i}_{31}^{(5)} : \Phi_4 = \Phi_{u21} - \Phi_{i31}.$$

$\dot{i}_{31}^{(5)} : \Phi_{i31} = \Phi_{u21} - \Phi_4.$

Pφ7

$$\dot{U}_{41}^{(5)} \quad \dot{i}_{31}^{(5)} : \Phi_7 = \Phi_{u41} - \Phi_{i31}.$$

$\dot{U}_{41}^{(5)} : \Phi_{u41} = \Phi_7 + \Phi_{i31}.$

$\dot{U}_{11}^{(5)} = U_{11}^{(5)} e^{j\Phi_{u11}} ; \quad \dot{U}_{21}^{(5)} = U_{21}^{(5)} e^{j\Phi_{u21}} ; \quad \dot{U}_{41}^{(5)} = U_{41}^{(5)} e^{j\Phi_{u41}} ;$
 $\dot{i}_{11}^{(5)} = I_{11}^{(5)} e^{j\Phi_{i11}} ; \quad \dot{i}_{31}^{(5)} = I_{31}^{(5)} e^{j\Phi_{i31}} .$

(1)

$$\left. \begin{aligned} \dot{U}_{12}^{(5)} &= B_{11}\dot{U}_{11}^{(5)} + B_{12}\dot{i}_{11}^{(5)} + B_{13}\dot{U}_{21}^{(5)} + B_{16}\dot{i}_{31}^{(5)} + B_{17}\dot{U}_{41}^{(5)} ; \\ \dot{U}_{22}^{(5)} &= B_{21}\dot{U}_{11}^{(5)} + B_{22}\dot{i}_{11}^{(5)} + B_{23}\dot{U}_{21}^{(5)} + B_{26}\dot{i}_{31}^{(5)} + B_{27}\dot{U}_{41}^{(5)} ; \\ 0 &= B_{31}\dot{U}_{11}^{(5)} + B_{32}\dot{i}_{11}^{(5)} + B_{33}\dot{U}_{21}^{(5)} + B_{36}\dot{i}_{31}^{(5)} + B_{37}\dot{U}_{41}^{(5)} ; \\ 0 &= B_{41}\dot{U}_{11}^{(5)} + B_{42}\dot{i}_{11}^{(5)} + B_{43}\dot{U}_{21}^{(5)} + B_{46}\dot{i}_{31}^{(5)} + B_{47}\dot{U}_{41}^{(5)} . \end{aligned} \right\} (6)$$

$\dot{U}_{12}^{(5)} \quad \dot{U}_{22}^{(5)}$

Pφ1

$$\dot{U}_{11}^{(7)} \quad \dot{i}_{11}^{(7)} : \Phi_1 = \Phi_{u11} - \Phi_{i11}.$$

$\dot{i}_{11}^{(7)} : \Phi_{i11} = \Phi_{u11} - \Phi_1.$

$\dot{U}_{21}^{(7)} \quad \dot{U}_{31}^{(7)}$

Pφ5

$$\dot{U}_{21}^{(7)} \quad \dot{U}_{31}^{(7)} : \Phi_5 = \Phi_{u31} - \Phi_{i11}.$$

$\Phi_{u31} = \Phi_5 + \Phi_{i11}.$

Pφ6

$$\dot{U}_{31}^{(7)} \quad \dot{i}_{41}^{(7)} : \Phi_6 = \Phi_{u31} - \Phi_{i41}.$$

$\dot{i}_{41}^{(7)} : \Phi_{i41} = \Phi_{u31} - \Phi_6.$

$\dot{U}_{11}^{(7)} = U_{11}^{(7)} e^{j\Phi_{u11}} ; \quad \dot{U}_{21}^{(7)} = U_{21}^{(7)} e^{j\Phi_{u21}} ; \quad \dot{U}_{31}^{(7)} = U_{31}^{(7)} e^{j\Phi_{u31}} ;$
 $\dot{i}_{11}^{(7)} = I_{11}^{(7)} e^{j\Phi_{i11}} ; \quad \dot{i}_{41}^{(7)} = I_{41}^{(7)} e^{j\Phi_{i41}} .$

(1)

$$\left. \begin{aligned} \dot{U}_{12}^{(6)} &= B_{11}\dot{U}_{11}^{(6)} + B_{12}\dot{i}_{11}^{(6)} + B_{13}\dot{U}_{21}^{(6)} + B_{16}\dot{i}_{31}^{(6)} + B_{17}\dot{U}_{41}^{(6)} ; \\ 0 &= B_{21}\dot{U}_{11}^{(6)} + B_{22}\dot{i}_{11}^{(6)} + B_{23}\dot{U}_{21}^{(6)} + B_{26}\dot{i}_{31}^{(6)} + B_{27}\dot{U}_{41}^{(6)} ; \\ 0 &= B_{31}\dot{U}_{11}^{(6)} + B_{32}\dot{i}_{11}^{(6)} + B_{33}\dot{U}_{21}^{(6)} + B_{36}\dot{i}_{31}^{(6)} + B_{37}\dot{U}_{41}^{(6)} ; \\ \dot{i}_{22}^{(6)} &= B_{41}\dot{U}_{11}^{(6)} + B_{42}\dot{i}_{11}^{(6)} + B_{43}\dot{U}_{21}^{(6)} + B_{45}\dot{i}_{31}^{(6)} + B_{47}\dot{U}_{41}^{(6)} . \end{aligned} \right\} (7)$$

$\dot{U}_{12}^{(6)} \quad \dot{i}_{22}^{(6)}$

(1)

$$\left. \begin{aligned} \dot{U}_{12}^{(7)} &= B_{11}\dot{U}_{11}^{(7)} + B_{12}\dot{i}_{11}^{(7)} + B_{13}\dot{U}_{21}^{(7)} + B_{15}\dot{U}_{31}^{(7)} + B_{18}\dot{i}_{41}^{(7)} ; \\ \dot{U}_{22}^{(7)} &= B_{21}\dot{U}_{11}^{(7)} + B_{22}\dot{i}_{11}^{(7)} + B_{23}\dot{U}_{21}^{(7)} + B_{25}\dot{U}_{31}^{(7)} + B_{28}\dot{i}_{41}^{(7)} ; \\ 0 &= B_{31}\dot{U}_{11}^{(7)} + B_{32}\dot{i}_{11}^{(7)} + B_{33}\dot{U}_{21}^{(7)} + B_{35}\dot{U}_{31}^{(7)} + B_{38}\dot{i}_{41}^{(7)} ; \\ 0 &= B_{41}\dot{U}_{11}^{(7)} + B_{42}\dot{i}_{11}^{(7)} + B_{43}\dot{U}_{21}^{(7)} + B_{45}\dot{U}_{31}^{(7)} + B_{48}\dot{i}_{41}^{(7)} . \end{aligned} \right\} (8)$$

$$\begin{aligned}
 & \dot{E}_1, \quad 2 \quad 3, \quad 4 \quad 5, \quad 1', \quad 2' \quad 3' \\
 & \dot{U}_{41}^{(8)}, \quad \dot{i}_{21}^{(8)}, \dot{i}_{31}^{(8)}, \quad \dot{i}_{12}^{(8)} \\
 & \dot{U}_{22}^{(8)} : \dot{i}_{21}^{(8)} = \dot{i}_{31}^{(8)} = \dot{i}_{12}^{(8)} = 0; \quad \dot{U}_{41}^{(8)} = \dot{U}_{22}^{(8)} = 0. \\
 & 3, \quad 5 \quad \vee 4, \quad \vee 6. \\
 & \dot{U}_{11}^{(8)}, \dot{U}_{21}^{(8)}, \dot{U}_{31}^{(8)} \\
 & \dot{i}_{11}^{(8)}, \dot{i}_{41}^{(8)} \\
 & \dot{U}_{12}^{(8)}, \dot{i}_{22}^{(8)}
 \end{aligned}$$

$$\begin{aligned}
 & \dot{U}_{12}^{(8)} = B_{11}\dot{U}_{11}^{(8)} + B_{12}\dot{i}_{11}^{(8)} + B_{13}\dot{U}_{21}^{(8)} + B_{15}\dot{U}_{31}^{(8)} + B_{18}\dot{i}_{41}^{(8)}; \\
 & 0 = B_{21}\dot{U}_{11}^{(8)} + B_{22}\dot{i}_{11}^{(8)} + B_{23}\dot{U}_{21}^{(8)} + B_{25}\dot{U}_{31}^{(8)} + B_{28}\dot{i}_{41}^{(8)}; \\
 & 0 = B_{31}\dot{U}_{11}^{(8)} + B_{32}\dot{i}_{11}^{(8)} + B_{33}\dot{U}_{21}^{(8)} + B_{35}\dot{U}_{31}^{(8)} + B_{38}\dot{i}_{41}^{(8)}; \\
 & \dot{i}_{22}^{(8)} = B_{41}\dot{U}_{11}^{(8)} + B_{42}\dot{i}_{11}^{(8)} + B_{43}\dot{U}_{21}^{(8)} + B_{45}\dot{U}_{31}^{(8)} + B_{48}\dot{i}_{41}^{(8)}.
 \end{aligned}$$

$$\begin{aligned}
 & (1) : \\
 & \left. \begin{aligned}
 & \dot{U}_{12}^{(8)} = B_{11}\dot{U}_{11}^{(8)} + B_{12}\dot{i}_{11}^{(8)} + B_{13}\dot{U}_{21}^{(8)} + B_{15}\dot{U}_{31}^{(8)} + B_{18}\dot{i}_{41}^{(8)}; \\
 & 0 = B_{21}\dot{U}_{11}^{(8)} + B_{22}\dot{i}_{11}^{(8)} + B_{23}\dot{U}_{21}^{(8)} + B_{25}\dot{U}_{31}^{(8)} + B_{28}\dot{i}_{41}^{(8)}; \\
 & 0 = B_{31}\dot{U}_{11}^{(8)} + B_{32}\dot{i}_{11}^{(8)} + B_{33}\dot{U}_{21}^{(8)} + B_{35}\dot{U}_{31}^{(8)} + B_{38}\dot{i}_{41}^{(8)}; \\
 & \dot{i}_{22}^{(8)} = B_{41}\dot{U}_{11}^{(8)} + B_{42}\dot{i}_{11}^{(8)} + B_{43}\dot{U}_{21}^{(8)} + B_{45}\dot{U}_{31}^{(8)} + B_{48}\dot{i}_{41}^{(8)}.
 \end{aligned} \right\} (9)
 \end{aligned}$$

$$\begin{aligned}
 & 32, \\
 & (2-9):
 \end{aligned}$$

$$\begin{aligned}
 B_{11} = & \frac{ekp\dot{U}_{12}^{(1)}\dot{i}_{11}^{(2)} - ekp\dot{i}_{11}^{(1)}\dot{U}_{12}^{(2)} + ekmi_{11}^{(1)}\dot{U}_{21}^{(2)} +}{ekp\dot{U}_{11}^{(1)}\dot{i}_{11}^{(2)} - ekp\dot{i}_{11}^{(1)}\dot{U}_{11}^{(2)} - ekn\dot{i}_{11}^{(1)}\dot{U}_{21}^{(2)} -} \\
 & \rightarrow \frac{+efp\dot{i}_{11}^{(1)}\dot{U}_{31}^{(2)} + ehmi_{11}^{(1)}\dot{U}_{31}^{(2)} + akpi_{11}^{(1)}\dot{U}_{41}^{(2)} +}{-egpi_{11}^{(1)}\dot{U}_{31}^{(2)} - ehni_{11}^{(1)}\dot{U}_{31}^{(2)} + bkpi_{11}^{(1)}\dot{U}_{41}^{(2)} -} \\
 & \rightarrow \frac{+ckmi_{11}^{(1)}\dot{U}_{41}^{(2)} + dfpi_{11}^{(1)}\dot{U}_{41}^{(2)} + dhmi_{11}^{(1)}\dot{U}_{41}^{(2)} -}{-ckni_{11}^{(1)}\dot{U}_{41}^{(2)} - dgpi_{11}^{(1)}\dot{U}_{41}^{(2)} - dhni_{11}^{(1)}\dot{U}_{41}^{(2)} -} \\
 & \rightarrow \frac{-ekm\dot{U}_{21}^{(1)}\dot{i}_{11}^{(2)} - efp\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} - ehm\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} -}{+ekn\dot{U}_{21}^{(1)}\dot{i}_{11}^{(2)} + edp\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} + ehn\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} -}
 \end{aligned}$$

$$\begin{aligned}
 & \rightarrow \frac{-akp\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} + ckm\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} - dfp\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} -}{-bkp\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} + ckn\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} + dgp\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} +} \\
 & \rightarrow \frac{-dhm\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)}}{+dhni_{41}^{(1)}\dot{i}_{11}^{(2)}};
 \end{aligned}$$

$$\begin{aligned}
 B_{13} &= \frac{m + B_{11}n}{p}; \\
 B_{15} &= \frac{f + B_{11}g + B_{13}h}{k}; \\
 B_{17} &= \frac{a - B_{11}b + B_{13}c + B_{15}d}{e};
 \end{aligned}$$

$$B_{12} = \frac{\dot{U}_{12}^{(2)} - B_{11}\dot{U}_{11}^{(2)} - B_{13}\dot{U}_{21}^{(2)} - B_{15}\dot{U}_{31}^{(2)} - B_{17}\dot{U}_{41}^{(2)}}{\dot{i}_{11}^{(2)}};$$

$$B_{14} = \frac{\dot{U}_{12}^{(4)} - B_{11}\dot{U}_{11}^{(4)} - B_{12}\dot{i}_{11}^{(4)} - B_{15}\dot{U}_{31}^{(4)} - B_{17}\dot{U}_{41}^{(4)}}{\dot{i}_{21}^{(4)}};$$

$$B_{16} = \frac{\dot{U}_{12}^{(6)} - B_{11}\dot{U}_{11}^{(6)} - B_{12}\dot{i}_{11}^{(6)} - B_{13}\dot{U}_{21}^{(6)} - B_{17}\dot{U}_{41}^{(6)}}{\dot{i}_{31}^{(6)}};$$

$$B_{18} = \frac{\dot{U}_{12}^{(8)} - B_{11}\dot{U}_{11}^{(8)} - B_{12}\dot{i}_{11}^{(8)} - B_{13}\dot{U}_{31}^{(8)} - B_{15}\dot{U}_{31}^{(8)}}{\dot{i}_{41}^{(8)}};$$

$$\begin{aligned}
 B_{21} = & \frac{ekp\dot{U}_{22}^{(1)}\dot{i}_{11}^{(2)} + eks\dot{i}_{11}^{(1)}\dot{U}_{21}^{(2)} + epr\dot{i}_{11}^{(1)}\dot{U}_{31}^{(2)} +}{ekp\dot{U}_{11}^{(1)}\dot{i}_{11}^{(2)} - ekp\dot{i}_{11}^{(1)}\dot{U}_{11}^{(2)} - ekn\dot{i}_{11}^{(1)}\dot{U}_{21}^{(2)} -} \\
 & \rightarrow \frac{+ehs\dot{i}_{11}^{(1)}\dot{U}_{31}^{(2)} + kpqi_{11}^{(1)}\dot{U}_{41}^{(2)} + cksi_{11}^{(1)}\dot{U}_{41}^{(2)} +}{-egpi_{11}^{(1)}\dot{U}_{31}^{(2)} - ehni_{11}^{(1)}\dot{U}_{31}^{(2)} + bkpi_{11}^{(1)}\dot{U}_{41}^{(2)} -} \\
 & \rightarrow \frac{+dhs\dot{i}_{11}^{(1)}\dot{U}_{41}^{(2)} - eks\dot{U}_{21}^{(1)}\dot{i}_{11}^{(2)} - epr\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} -}{dhni_{11}^{(1)}\dot{U}_{41}^{(2)} + ekn\dot{U}_{21}^{(1)}\dot{i}_{11}^{(2)} + edp\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} +} \\
 & \rightarrow \frac{-ehs\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} - kpqi_{41}^{(1)}\dot{i}_{11}^{(2)} + cks\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} -}{+ehn\dot{U}_{31}^{(1)}\dot{i}_{11}^{(2)} - bkpi_{41}^{(1)}\dot{i}_{11}^{(2)} + ckn\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} +} \\
 & \rightarrow \frac{-dpr\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} - dhs\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)}}{+dgp\dot{U}_{41}^{(1)}\dot{i}_{11}^{(2)} + dhni_{41}^{(1)}\dot{i}_{11}^{(2)}};
 \end{aligned}$$

$$\begin{aligned}
 B_{23} &= \frac{s + B_{21}n}{p}; \\
 B_{25} &= \frac{r + B_{21}g + B_{23}h}{k};
 \end{aligned}$$

$$B_{17} = \frac{q - B_{21}b + B_{23}c + B_{25}d}{e};$$

$$B_{22} = \frac{-B_{21}\dot{U}_{11}^{(2)} - B_{23}\dot{U}_{21}^{(2)} - B_{25}\dot{U}_{31}^{(2)} - B_{27}\dot{U}_{41}^{(2)}}{\dot{i}_{11}^{(2)}};$$

$$B_{24} = \frac{-B_{21}\dot{U}_{11}^{(4)} - B_{22}\dot{i}_{11}^{(4)} - B_{25}\dot{U}_{31}^{(4)} - B_{27}\dot{U}_{41}^{(4)}}{\dot{i}_{21}^{(4)}};$$

$$B_{26} = \frac{-B_{21}\dot{U}_{11}^{(6)} - B_{22}\dot{i}_{11}^{(6)} - B_{23}\dot{U}_{21}^{(6)} - B_{27}\dot{U}_{41}^{(6)}}{\dot{i}_{31}^{(6)}};$$

$$B_{28} = \frac{-B_{21}\dot{U}_{11}^{(8)} - B_{22}\dot{i}_{11}^{(8)} - B_{23}\dot{U}_{31}^{(8)} - B_{25}\dot{U}_{31}^{(8)}}{\dot{i}_{41}^{(8)}};$$

$$B_{31} = 0;$$

$$\begin{aligned}
 B_{33} &= \frac{B_{31}n}{p}; \\
 B_{35} &= \frac{B_{31}g + B_{33}h}{k}; \\
 B_{37} &= \frac{-B_{31}b + B_{33}c + B_{35}d}{e}; \\
 B_{32} &= \frac{-B_{31}\dot{U}_{11}^{(2)} - B_{33}\dot{U}_{21}^{(2)} - B_{35}\dot{U}_{31}^{(2)} - B_{37}\dot{U}_{41}^{(2)}}{\dot{I}_{11}^{(2)}}; \\
 B_{34} &= \frac{-B_{31}\dot{U}_{11}^{(4)} - B_{32}\dot{U}_{11}^{(4)} - B_{35}\dot{U}_{31}^{(4)} - B_{37}\dot{U}_{41}^{(4)}}{\dot{I}_{21}^{(4)}}; \\
 B_{36} &= \frac{-B_{31}\dot{U}_{11}^{(6)} - B_{32}\dot{U}_{11}^{(6)} - B_{33}\dot{U}_{21}^{(6)} - B_{37}\dot{U}_{41}^{(6)}}{\dot{I}_{31}^{(6)}}; \\
 B_{38} &= \frac{-B_{31}\dot{U}_{11}^{(8)} - B_{32}\dot{U}_{11}^{(8)} - B_{33}\dot{U}_{31}^{(8)} - B_{35}\dot{U}_{31}^{(8)}}{\dot{I}_{41}^{(8)}}; \\
 B_{41} &= \frac{-ekp\dot{I}_{11}^{(1)}\dot{I}_{22}^{(2)} + ekw\dot{I}_{11}^{(1)}\dot{U}_{21}^{(2)} + epv\dot{I}_{11}^{(1)}\dot{U}_{31}^{(2)} +}{ekp\dot{U}_{11}^{(1)}\dot{I}_{11}^{(2)} - ekp\dot{I}_{11}^{(1)}\dot{U}_{21}^{(2)} - ekn\dot{I}_{11}^{(1)}\dot{U}_{21}^{(2)} -} \rightarrow \\
 &\rightarrow \frac{+ehw\dot{I}_{11}^{(1)}\dot{U}_{31}^{(2)} + kpt\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} + ckw\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} +}{-egp\dot{I}_{11}^{(1)}\dot{U}_{31}^{(2)} - ehn\dot{I}_{11}^{(1)}\dot{U}_{31}^{(2)} + bkp\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} -} \rightarrow \\
 &\rightarrow \frac{+dpv\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} + dhw\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} - ekw\dot{U}_{21}^{(1)}\dot{I}_{11}^{(2)} -}{-ckn\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} - dgp\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} - dhn\dot{I}_{11}^{(1)}\dot{U}_{41}^{(2)} +} \rightarrow \\
 &\rightarrow \frac{-epv\dot{U}_{31}^{(1)}\dot{I}_{11}^{(2)} - ehw\dot{U}_{31}^{(1)}\dot{I}_{11}^{(2)} - kpt\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)} +}{+ekn\dot{U}_{21}^{(1)}\dot{I}_{11}^{(2)} + edp\dot{U}_{31}^{(1)}\dot{I}_{11}^{(2)} + ehm\dot{U}_{31}^{(1)}\dot{I}_{11}^{(2)} -} \rightarrow \\
 &\rightarrow \frac{+ckw\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)} - dpv\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)} -}{-bkp\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)} + ckn\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)} + dgp\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)} +} \rightarrow \\
 &\rightarrow \frac{-dhw\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)}}{+dhn\dot{U}_{41}^{(1)}\dot{I}_{11}^{(2)}}; \\
 B_{43} &= \frac{w + B_{41}n}{p}; \\
 B_{45} &= \frac{v + B_{41}g + B_{43}h}{k}; \\
 B_{47} &= \frac{t - B_{41}b + B_{43}c + B_{45}d}{e}; \\
 B_{42} &= \frac{\dot{I}_{22}^{(2)} - B_{41}\dot{U}_{11}^{(2)} - B_{43}\dot{U}_{21}^{(2)} - B_{45}\dot{U}_{31}^{(2)} - B_{47}\dot{U}_{41}^{(2)}}{\dot{I}_{11}^{(2)}}; \\
 B_{44} &= \frac{\dot{I}_{22}^{(4)} - B_{41}\dot{U}_{11}^{(4)} - B_{42}\dot{U}_{11}^{(4)} - B_{45}\dot{U}_{31}^{(4)} - B_{47}\dot{U}_{41}^{(4)}}{\dot{I}_{21}^{(4)}}; \\
 B_{46} &= \frac{\dot{I}_{22}^{(6)} - B_{41}\dot{U}_{11}^{(6)} - B_{42}\dot{U}_{11}^{(6)} - B_{43}\dot{U}_{21}^{(6)} - B_{47}\dot{U}_{41}^{(6)}}{\dot{I}_{31}^{(6)}}; \\
 B_{48} &= \frac{\dot{I}_{22}^{(8)} - B_{41}\dot{U}_{11}^{(8)} - B_{42}\dot{U}_{11}^{(8)} - B_{43}\dot{U}_{31}^{(8)} - B_{45}\dot{U}_{31}^{(8)}}{\dot{I}_{41}^{(8)}}; \\
 a &= \dot{U}_{12}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{11}^{(7)}\dot{I}_{41}^{(8)} - \left(\dot{I}_{11}^{(2)}\right)^2\dot{U}_{12}^{(7)}\dot{I}_{41}^{(8)} + \left(\dot{I}_{11}^{(2)}\right)^2\dot{I}_{41}^{(7)}\dot{U}_{12}^{(8)} + \\
 &\quad + \dot{U}_{12}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{41}^{(7)}\dot{I}_{11}^{(8)};
 \end{aligned}$$

$$\begin{aligned}
 b &= \left(\dot{I}_{11}^{(2)}\right)^2\dot{U}_{11}^{(7)}\dot{I}_{41}^{(8)} - \dot{U}_{11}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{11}^{(7)}\dot{I}_{41}^{(8)} - \\
 &\quad - \left(\dot{I}_{11}^{(2)}\right)^2\dot{I}_{41}^{(7)}\dot{U}_{11}^{(8)} - \dot{U}_{11}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{41}^{(7)}\dot{I}_{11}^{(8)}; \\
 c &= \dot{U}_{21}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{11}^{(7)}\dot{I}_{41}^{(8)} - \left(\dot{I}_{11}^{(2)}\right)^2\dot{U}_{21}^{(7)}\dot{I}_{41}^{(8)} + \\
 &\quad + \dot{U}_{21}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{41}^{(7)}\dot{I}_{11}^{(8)} + \left(\dot{I}_{11}^{(2)}\right)^2\dot{I}_{41}^{(7)}\dot{U}_{21}^{(8)}; \\
 d &= \dot{U}_{31}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{11}^{(7)}\dot{I}_{41}^{(8)} - \left(\dot{I}_{11}^{(2)}\right)^2\dot{U}_{31}^{(7)}\dot{I}_{41}^{(8)} + \\
 &\quad + \dot{U}_{31}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{41}^{(7)}\dot{I}_{11}^{(8)} + \left(\dot{I}_{11}^{(2)}\right)^2\dot{I}_{41}^{(7)}\dot{U}_{31}^{(8)}; \\
 e &= \dot{U}_{41}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{11}^{(7)}\dot{I}_{41}^{(8)} + \dot{U}_{41}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{41}^{(7)}\dot{I}_{11}^{(8)}; \\
 f &= e\dot{U}_{12}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} - e\dot{I}_{11}^{(2)}\dot{U}_{12}^{(5)}\dot{I}_{31}^{(6)} - a\dot{U}_{41}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} + \\
 &\quad + e\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{12}^{(6)} - e\dot{U}_{12}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} + a\dot{U}_{41}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} - \\
 &\quad - a\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{41}^{(6)} + a\dot{I}_{11}^{(2)}\dot{U}_{41}^{(5)}\dot{I}_{31}^{(6)}; \\
 g &= e\dot{I}_{11}^{(2)}\dot{U}_{11}^{(5)}\dot{I}_{31}^{(6)} - e\dot{U}_{11}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} + b\dot{U}_{41}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} - \\
 &\quad - e\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{12}^{(6)} - e\dot{U}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} - b\dot{U}_{41}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} + \\
 &\quad + b\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{41}^{(6)} - b\dot{I}_{11}^{(2)}\dot{U}_{41}^{(5)}\dot{I}_{31}^{(6)}; \\
 h &= e\dot{U}_{21}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} + c\dot{U}_{41}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} - e\dot{I}_{11}^{(2)}\dot{U}_{21}^{(5)}\dot{I}_{31}^{(6)} - \\
 &\quad - e\dot{U}_{21}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} - c\dot{U}_{41}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} + e\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{21}^{(6)} + \\
 &\quad + c\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{41}^{(6)} - c\dot{I}_{11}^{(2)}\dot{U}_{41}^{(5)}\dot{I}_{31}^{(6)}; \\
 k &= e\dot{U}_{31}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} + d\dot{U}_{41}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} - e\dot{U}_{31}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} - \\
 &\quad - d\dot{U}_{41}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} + d\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{41}^{(6)} - d\dot{I}_{11}^{(2)}\dot{U}_{41}^{(5)}\dot{I}_{31}^{(6)}; \\
 m &= ek\dot{U}_{12}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - ek\dot{I}_{11}^{(2)}\dot{U}_{12}^{(3)}\dot{I}_{21}^{(4)} - ef\dot{U}_{31}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - \\
 &\quad - ak\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - df\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} + ek\dot{I}_{11}^{(2)}\dot{I}_{31}^{(3)}\dot{U}_{12}^{(4)} - \\
 &\quad - ek\dot{U}_{12}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + ef\dot{U}_{31}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + ak\dot{U}_{41}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + \\
 &\quad + df\dot{U}_{21}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - ef\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{31}^{(4)} - ak\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} - \\
 &\quad - df\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} + ef\dot{I}_{11}^{(2)}\dot{U}_{31}^{(3)}\dot{I}_{21}^{(4)} + ak\dot{I}_{11}^{(2)}\dot{U}_{31}^{(3)}\dot{I}_{21}^{(4)} + \\
 &\quad + df\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)}; \\
 n &= ek\dot{I}_{11}^{(2)}\dot{U}_{11}^{(3)}\dot{I}_{21}^{(4)} - ek\dot{U}_{11}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - eg\dot{U}_{31}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} + \\
 &\quad + bk\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - dg\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - ek\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{11}^{(4)} + \\
 &\quad + ek\dot{U}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + eg\dot{U}_{31}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - bk\dot{U}_{41}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + \\
 &\quad + dg\dot{U}_{41}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - eg\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{31}^{(4)} + bk\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} - \\
 &\quad - dg\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} + eg\dot{I}_{11}^{(2)}\dot{U}_{31}^{(3)}\dot{I}_{21}^{(4)} - bk\dot{I}_{11}^{(2)}\dot{U}_{31}^{(3)}\dot{I}_{21}^{(4)} + \\
 &\quad + dg\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)}; \\
 p &= ek\dot{U}_{21}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} + eh\dot{U}_{31}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} + ck\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} + \\
 &\quad + dh\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - ek\dot{U}_{21}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - eh\dot{U}_{31}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} -
 \end{aligned}$$

$$\begin{aligned}
 & -ck\dot{U}_{41}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - dh\dot{U}_{41}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - eh\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{31}^{(4)} + \\
 & + ck\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} + dh\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} - eh\dot{I}_{11}^{(2)}\dot{U}_{21}^{(3)}\dot{I}_{21}^{(4)} - \\
 & - ck\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)} - dh\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)};
 \end{aligned}$$

$$q = -(\dot{I}_{11}^{(2)})^2 \dot{U}_{22}^{(7)} \dot{I}_{41}^{(8)};$$

$$\begin{aligned}
 r &= -e\dot{I}_{11}^{(2)}\dot{U}_{22}^{(5)}\dot{I}_{31}^{(6)} - q\dot{U}_{41}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} - \\
 & q\dot{U}_{41}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} - q\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{41}^{(6)} + q\dot{I}_{11}^{(2)}\dot{U}_{41}^{(5)}\dot{I}_{31}^{(6)};
 \end{aligned}$$

$$\begin{aligned}
 s &= -ek\dot{I}_{11}^{(2)}\dot{U}_{22}^{(3)}\dot{I}_{21}^{(4)} - er\dot{U}_{31}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - kq\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - \\
 & dr\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} + er\dot{U}_{31}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - \\
 & - kq\dot{U}_{41}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + dr\dot{U}_{21}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - er\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{31}^{(4)} - \\
 & - kq\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} - dr\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} + er\dot{I}_{11}^{(2)}\dot{U}_{31}^{(3)}\dot{I}_{21}^{(4)} + \\
 & + kq\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)} + dr\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)};
 \end{aligned}$$

$$t = \dot{I}_{22}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{11}^{(7)}\dot{I}_{41}^{(8)} + (\dot{I}_{11}^{(2)})^2 \dot{I}_{41}^{(7)}\dot{I}_{22}^{(8)} + \dot{I}_{22}^{(2)}\dot{I}_{11}^{(2)}\dot{I}_{41}^{(7)}\dot{I}_{11}^{(8)};$$

$$\begin{aligned}
 v &= e\dot{I}_{22}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} - t\dot{U}_{41}^{(2)}\dot{I}_{11}^{(5)}\dot{I}_{31}^{(6)} + e\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{22}^{(6)} - \\
 & e\dot{I}_{22}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} + t\dot{U}_{41}^{(2)}\dot{I}_{31}^{(5)}\dot{I}_{11}^{(6)} - t\dot{I}_{11}^{(2)}\dot{I}_{31}^{(5)}\dot{U}_{41}^{(6)} + \\
 & + t\dot{I}_{11}^{(2)}\dot{U}_{41}^{(5)}\dot{I}_{31}^{(6)};
 \end{aligned}$$

$$\begin{aligned}
 m &= ek\dot{I}_{22}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - ev\dot{U}_{31}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - kt\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} - \\
 & dv\dot{U}_{41}^{(2)}\dot{I}_{11}^{(3)}\dot{I}_{21}^{(4)} + ek\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{22}^{(4)} - ek\dot{I}_{22}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + \\
 & + ev\dot{U}_{31}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - kt\dot{U}_{41}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} + dv\dot{U}_{21}^{(2)}\dot{I}_{21}^{(3)}\dot{I}_{11}^{(4)} - \\
 & - ev\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{31}^{(4)} - kt\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} - dv\dot{I}_{11}^{(2)}\dot{I}_{21}^{(3)}\dot{U}_{41}^{(4)} + \\
 & + ev\dot{I}_{11}^{(2)}\dot{U}_{31}^{(3)}\dot{I}_{21}^{(4)} + kt\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)} + dv\dot{I}_{11}^{(2)}\dot{U}_{41}^{(3)}\dot{I}_{21}^{(4)}.
 \end{aligned}$$

17].

[18–21].

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