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LAMPIRAN-LAMPIRAN

Tabel A1: Daftar 100 badai geomagnet yang digunakan dalam penelitian ini dan parameter IMF serta angin Matahari. Untuk sebagian besar kasus, klasifikasi kami sebanding dengan Chi dkk. (2016), Pandya dkk. (2019), atau Hajra dan Sunny (2022)

Lampiran

Day of Storm	Time (UT)	Dst_{min} (nT)	B_z (nT)	N (Ncm^{-3})	V (km/s)	$dT_{Bz,\ N}$ (h)	$dT_{Bz,\ V}$ (h)	$dT_{Bz,\ Dst}$ (h)	Driver-Storm
28/02/2008	23	-52	-5.1	15.4	498	6	2	5	CIR
09/03/2008	6	-86	-10.6	16.3	487	2	1	1	CIR
27/03/2008	22	-56	-5.4	3.6	642	6	1	3	CIR
04/09/2008	5	-51	-8.7	13.8	488	3	0	2	CIR
11/10/2008	12	-54	-11.0	28.1	352	1	0	3	CIR
22/07/2009	7	-83	-14.5	28.5	341	2	0	2	CIR
15/02/2010	23	-58	-12.0	12.2	325	0	0	4	CME
06/04/2010	15	-81	-6.8	2.5	569	2	2	5	CME
12/04/2010	2	-67	-8.0	11.3	441	0	5	1	CIR
02/05/2010	19	-71	-8.2	37.7	402	3	0	7	CIR
29/05/2010	13	-80	-13.8	9.8	359	8	10	1	CME
04/08/2010	2	-74	-6.1	7.7	597	0	7	2	CME
11/10/2010	20	-75	-11.6	36.4	365	5	2	8	CME
04/02/2011	22	-63	-15.9	27.7	445	2	0	1	CME
01/03/2011	15	-88	-12.1	38.0	382	7	4	2	CME
11/03/2011	6	-83	-10.0	14.5	383	10	0	9	CME
06/04/2011	19	-60	-8.7	12.5	536	3	3	5	CME
28/05/2011	12	-80	-10.7	8.9	508	2	0	2	CME
05/07/2011	1	-59	-8.7	3.6	409	0	0	6	CIR
06/08/2011	4	-115	-19.3	26.8	611	1	1	6	CME
10/09/2011	5	-75	-17.1	37.6	482	3	0	12	CME
17/09/2011	16	-72	-7.2	29.5	537	2	0	5	CME
26/09/2011	24	-118	-24.1	24.4	594	3	0	5	CME
25/10/2011	2	-147	-13.1	25.2	495	4	4	2	CME
01/11/2011	16	-66	-7.9	8.8	432	3	0	3	CME
09/03/2012	9	-145	-16.4	7.1	678	4	4	3	CME
24/04/2012	5	-120	-15.4	23.5	416	2	10	10	CIR
15/07/2012	17	-139	-18.7	20.7	665	5	10	6	CME
01/10/2012	5	-122	-19.2	32.2	394	14	1	3	CME
09/10/2012	9	-109	-14.9	6.7	391	3	0	4	CME
13/10/2012	8	-90	-10.4	6.0	482	1	2	4	CME
14/11/2012	8	-108	-17.4	14.8	397	1	3	4	CME
26/01/2013	24	-52	-8.1	8.0	496	2	1	1	CIR
01/03/2013	11	-55	-13.4	13.0	473	1	0	2	CIR
17/03/2013	21	-132	-14.4	13.4	680	2	1	11	CME
29/03/2013	17	-59	-8.9	10.3	478	3	0	1	CIR
01/06/2013	9	-124	-17.4	39.0	405	3	1	6	CME
29/06/2013	7	-102	-11.9	11.2	404	8	8	7	CME
06/07/2013	19	-87	-11.2	7.6	352	0	1	9	CME
27/08/2013	22	-59	-10.0	23.5	407	2	0	2	CIR
02/10/2013	8	-72	-8.8	22.9	625	0	0	3	CME
30/10/2013	24	-56	-8.1	8.5	373	6	3	2	CIR
08/12/2013	9	-66	-9.8	34.0	488	1	0	5	CIR
19/02/2014	9	-119	-12.9	9.8	474	3	2	3	CME
27/02/2014	24	-97	-12.0	29.7	481	4	2	2	CME
12/04/2014	10	-87	-8.9	7.4	350	1	4	3	CME

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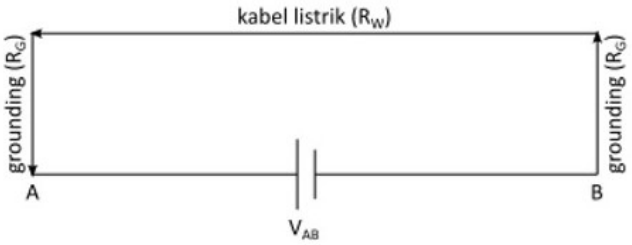
30/04/2014	10	-67	-8.1	9.8	308	1	1	0	CME
27/08/2014	10	-79	-13.1	14.8	303	1	2	4	CIR
12/09/2014	24	-88	-11.3	19.3	651	1	4	2	CME
22/12/2014	5	-71	-14.9	24.6	407	2	2	3	CME
23/12/2014	23	-57	-5.0	2.3	527	5	1	8	CME
07/01/2015	12	-107	-17.4	29.4	475	2	2	2	CME
18/02/2015	1	-69	-12.0	10.8	410	6	7	3	CIR
24/02/2015	8	-58	-5.6	12.3	492	2	0	2	CIR
02/03/2015	9	-64	-8.5	11.2	574	4	0	2	CIR
17/03/2015	23	-234	-18.1	33.7	614	9	3	8	CME
11/04/2015	10	-85	-8.5	11.2	574	4	0	2	CME
16/04/2015	24	-88	-6.0	7.0	664	4	1	1	CIR
13/05/2015	7	-82	-8.9	9.9	597	0	0	1	CIR
08/06/2015	9	-67	-14.4	15.1	468	1	0	2	CIR
23/06/2015	5	-198	-22.2	40.4	673	0	0	9	CME
05/07/2015	6	-74	-14.0	37.4	475	4	0	9	CIR
13/07/2015	16	-68	-7.4	7.3	642	1	6	6	CIR
23/07/2015	9	-72	-11.0	8.0	400	3	2	2	CME
16/08/2015	8	-98	-8.4	8.2	514	4	2	1	CME
27/08/2015	21	-103	-10.8	14.0	362	2	5	2	CME
09/09/2015	13	-105	-10.2	14.0	527	4	3	3	CME
07/10/2015	23	-124	-11.2	29.4	462	1	7	8	CIR
07/11/2015	7	-87	-9.9	7.8	677	6	1	2	CME
20/12/2015	23	-166	-17.0	62.7	418	12	7	1	CME
01/01/2016	1	-116	-15.8	25.5	465	9	8	4	CME
20/01/2016	17	-101	-15.8	24.1	461	6	6	4	CIR
03/02/2016	3	-57	-8.3	27.0	358	5	1	1	CIR
18/02/2016	1	-62	-6.6	6.3	552	4	4	7	CIR
06/03/2016	22	-99	-12.7	32.0	552	3	0	2	CIR
08/05/2016	8	-95	-11.5	15.1	485	1	0	6	CIR
03/08/2016	16	-52	-15.1	16.5	430	3	1	1	CIR
23/08/2016	22	-73	-11.1	13.6	433	1	1	2	CIR
02/09/2016	3	-59	-5.9	6.7	570	0	3	5	CIR
29/09/2016	10	-65	-5.2	4.3	692	0	0	3	CIR
13/10/2016	18	-110	-20.8	30.5	437	11	7	1	CME
01/03/2017	22	-61	-4.6	19.0	649	8	0	3	CIR
27/03/2017	15	-70	-8.6	26.6	523	6	0	5	CIR
22/04/2017	17	-51	-4.8	5.8	703	0	10	3	CME
28/05/2017	8	-125	-22.8	62.1	401	5	2	6	CME
16/07/2017	16	-72	-20.2	43.8	506	5	0	3	CME
08/09/2017	2	-122	-24.2	6.4	690	10	0	1	CME
28/09/2017	6	-75	-7.0	7.1	669	6	3	2	CIR
08/11/2017	2	-73	-7.2	32.2	526	5	0	7	CIR
20/04/2018	10	-66	-13.5	49.5	426	4	0	1	CIR
06/05/2018	3	-57	-6.8	36.1	547	3	0	8	CIR
26/08/2018	7	-175	-16.8	20.3	412	3	6	1	CIR
11/09/2018	11	-60	-7.9	7.8	570	1	2	2	CME
07/10/2018	22	-53	-8.3	46.3	503	5	0	6	CIR
05/11/2018	6	-53	-6.5	22.5	571	6	0	1	CIR
14/05/2019	8	-65	-12.7	10.1	537	5	1	2	CME
05/08/2019	21	-53	-7.9	19.9	489	1	0	13	CIR
18/02/2020	17	-52	-8.8	14.2	395	0	0	2	CME
20/04/2020	13	-59	-14.4	34.5	371	2	2	2	CME
25/07/2020	0	-52	-8.0	9.8	375	5	0	3	CIR

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Tabel A.2. Kondisi Nsw dan Psw, B_z dan waktu tunda (lag time) saat kejadian badai geomagnet

No	Start	End	N_{max} (1/cm^3)	MinB_z (nT)	Lag dT (Hours)	MinDst (nT)	P_{max} (nPa)
1	15-01-1995	20-01-1995	20,7	-14,3	17	-95	-14,3
2	03-03-1995	09-03-1995	27,5	-8,8	9	-90	-8,8
3	25-03-1995	28-03-1995	55	-15,4	1	-107	-15,4
4	21-04-1995	25-04-1995	27,5	-7,9	3	-53	-7,9
5	30-11-1995	07-12-1995	17,7	-9,2	1	-62	-9,2
6	23-05-1997	29-05-1997	32,4	-10,4	10	-73	-10,4
7	16-09-1997	19-09-1997	12,6	-9,1	8	-56	-9,1
8	12-11-1997	16-11-1997	24,7	-6,4	15	-49	-6,4
9	29-12-1997	04-01-1998	34,7	-10,4	8	-77	-10,4
10	15-02-1998	21-02-1998	12,4	-15,1	7	-100	-15,1
11	23-03-1998	25-03-1998	11,6	-5,3	12	-43	-5,3
12	25-03-1998	26-03-1998	14,3	-7,2	1	-56	-7,2
13	04-08-1998	09-08-1998	23,2	-19,3	1	-138	-19,3
14	16-08-1998	24-08-1998	25,6	-10,2	3	-67	-10,2
15	16-10-1998	24-10-1998	65,3	-16,7	10	-112	-16,7
16	11-11-1998	17-11-1998	33,4	-17,6	6	-128	-17,6
17	08-12-1998	17-12-1998	11,2	-12,7	7	-69	-12,7
18	28-02-1999	01-03-1999	22,6	-13,4	9	-94	-13,4
19	01-03-1999	06-03-1999	56	-14,4	4	-95	-14,4
20	14-11-1999	19-11-1999	19,1	-11,5	2	-79	-11,5
21	20-01-2000	26-01-2000	28	-15,7	7	-97	-15,7
22	29-03-2000	05-04-2000	18,7	-7,2	3	-60	-7,2
23	25-10-2000	02-11-2000	39,3	-17,1	3	-127	-17,1
24	17-12-2000	26-12-2000	24,9	-13,9	5	-62	-13,9
25	24-02-2001	28-02-2001	44,6	-6,4	4	-37	-6,4
26	20-04-2001	27-04-2001	29,7	-12,8	14	-102	-12,8
27	09-09-2001	17-09-2001	21,4	-9,7	35	-57	-9,7
28	30-10-2001	04-11-2001	23,4	-12,5	4	-106	-12,5
29	10-12-2001	14-12-2001	26,6	-6,1	3	-39	-6,1
30	27-12-2001	04-01-2002	67,2	-9,8	14	-58	-9,8

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Gambar A1. *Ilustrasi sistem aliran arus GIC, dalam satu rangkaian loop seri yang terdiri dari sumber tegangan (V_{AB}, Volt), arus GIC (I) dan hambatan (R). Keterangan: R_G hambatan di trafo-1 dan trafo-2. R_w adalah hambatan di kabel listrik.*

Dalam riset ini, perhitungan I_{GIC} dalam riset ini dilakukan dengan metode geofisika, yakni menghitung nilai I_{GIC} yang mengalir pada kabel netral trafo dan kabel listrik, dengan sumber tegangan mengalir dipermukaan Bumi, sehingga komponen medan geomagnet dan konduktivitas tanah menjadi data utama. Diketahui bahwa **Gambar A1.**, adalah satu rangkaian loop seri yang terdiri dari baterai (sumber voltase, $V_{baterai}$), kabel trafo-1,2 ($R_{g1,2}$) dan kabel jaringan Listrik (R_W). Dengan I_w adalah arus dalam kabel transmisi dan I_g adalah arus yang mengalir dalam kabel trafo ke ground. Untuk rangkaian dengan percabangan maka perhitungan arus I_{GIC} merujuk pada Gambar **A2**, **A3** dan **A4** sesuai jumlah percabangan.

Karena rangkaian loop-nya adalah seri maka diketahui bahwa nilai arus GIC (I_{GIC}) untuk 1 *loop* adalah

$$I_{GIC} = I_{trafo1} + I_{trafo2} + I_w \qquad \text{(A-1)}$$

Agar bisa menghitung nilai arus GIC (I_{GIC}) maka nilai R_{total} seri adalah

$$R_{total} = R_{trafo1} + R_{trafo2} + R_w \qquad \text{(A-2)}$$

Nilai R bergantung dari jenis dan tipe bahan yang digunakan.

Jadi $I_{GIC} = V_{AB} / R_{total}$ (A-3)

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Contoh ilustrasi menghitung I_{GIC} dengan $V_{AB} = 65\ Volt$ dan panjang lintasan transmisi 65 km

- kabel JAMALI diasumsikan terbuat dari *Aluminium Alloy Conductor Steel Reinforced* (AACSR) atau *Aluminium Conductor Alloy Reinforced*. Beberapa keunggulannya: Konduktivitas Tinggi (60%), Kekuatan Tarik Tinggi dan Ketahanan Terhadap Cuaca. Nilai ρ_{AACSR} diasumsikan **0,07 Ω/km pada 20 °C (IEEE Standard 738-2012**, **SPLN D3.004-1:2008)**. Jadi nilai R_w adalah

  $R_w = 0{,}07\ \Omega/\ km\ x\ 65\ km = 4{,}55\ \Omega$
- trafo-1 dan trafo-2, diasumsikan bahwa tinggi rata-rata tower trafo SUTET 500 kV = 37,5 m dan kabel netral trafo tertanam rata-rata sedalam 1,5 m. Dengan bahan yang umumnya terbuat dari tembaga maka R_G = 0,001 Ω (**SNI IEC 60228:2016**, **IEEE Std 80-2013**)

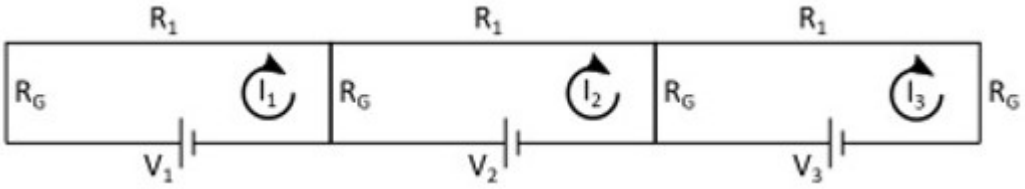
  $R_{trafo\text{-}1} = R_{trafo\text{-}2} = 0{,}002\ \Omega$
- Jadi $R_{total} = R_k + R_{trafo\text{-}1} + R_{tarfo\text{-}2}$

  $= 4{,}55 + 0{,}002 + 0{,}002$

  $= 4{,}554\ \Omega$

Maka sebagai studi kasus nilai I_{GIC} adalah

$I_{GIC} = V_{total}/\ R_{total} = 65\ V/\ 4{,}554\ \Omega = 14{,}27\ A$



Gambar A.2. *Ilustrasi rangkaian beberapa loop jaringan transmisi sistem JAMALI*

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Gambar A.2., menujukkan rangkaian tiga loop tunggal terhubung seri, dengan sumber tegangan pada loop-1 adalah V_1, hambatan netral trafo adalah R_G dan hambatan kabel pada loop-1 adalah R_1. Perhitungan arus GIC pada **Gambar A.2.**, yakni rangkaian dengan masing-masing loop tunggal seri. Nilai arus GIC (I_{GIC}) pada masing-masing loop tunggal dalam rangkaian itu dapat dihitung dengan menggunakan hukum Kirchhoff:

Loop tunggal sisi kiri,

$$V_1 = I_1R_1 + (I_1 - I_2)\, R_G \qquad \text{(A-4)}$$

Loop tunggal bagian tengah,

$$V_2 = I_2\, R_1 + (I_2 - I_1)\, R_G + (I_2 - I_3)\, R_G \qquad \text{(A-5)}$$

Loop tunggal sisi kanan

$$V_3 = I_3\, R_1 + (I_3 - I_2)\, R_G \qquad \text{(A-6)}$$

Contoh ilustrasi menghitung I_{GIC} dengan $V_1 = 50\ Volt$, $V_2 = 40\ Volt$ dan $V_3 = 65\ Volt$ dengan panjang lintasan transmisi $L1$ = 65 km, L_2 = 50 km dan L_3 = 80 km.

- kabel JAMALI diasumsikan terbuat dari *Aluminium Alloy Conductor Steel Reinforced* (AACSR) atau *Aluminium Conductor Alloy Reinforced* dengan resistensi = **0,07 Ω/km pada 20 °C (IEEE Standard 738-2012**, **SPLN D3.004-1:2008)**. Jadi nilai R_w adalah

  $R_1 = 0{,}07\ \Omega/\ km\ x\ 65\ km = 4{,}55\ \Omega$

  $R_2 = 0{,}07\ \Omega/\ km\ x\ 50\ km = 3{,}50\ \Omega$

  $R_3 = 0{,}07\ \Omega/\ km\ x\ 80\ km = 5{,}60\ \Omega$

- trafo-1 dan trafo-2, diasumsikan bahwa tinggi rata-rata tower trafo SUTET 500 kV = 37,5 m dan kabel netral trafo tertanam rata-rata sedalam 1,5 m. R_G = 0,001 Ω (**SNI IEC 60228:2016**, **IEEE Std 80-2013**)

  $R_g = 0{,}002\ \Omega$

- Dengan data-data di atas maka kita hitung I_1, I_2 dan I_3 menggunakan

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persamaan (A-4), **(A-5)** dan **(A-6)**

$V_1 = I_1R_1 + (I_1 - I_2)\, R_G$

$\rightarrow 50 = I_1\, 4{,}552 - I_2\, 0{,}002 \rightarrow I_1 = \left(\frac{50}{4{,}552}\right) + \left(\frac{0{,}002}{4{,}552}\right) I_2$

$\rightarrow I_1 = 10{,}948 + (4{,}39 \times 10^{-4})\, I_2$

$V_2 = I_2\, R_1 + (I_2 - I_1)\, R_G + (I_2 - I_3)\, R_G$

$\rightarrow 40 = I_2\, 4{,}554 - (I_1 + I_3)\, 0{,}002 \rightarrow I_2 = \left(\frac{40}{4{,}552}\right) + \left(\frac{0{,}002}{4{,}552}\right) (I_1 + I_3)$

$\rightarrow I_2 = 8{,}783 + (4{,}39 \times 10^{-4})\, (I_1 + I_3)$

$V_3 = I_3\, R_1 + (I_3 - I_2)\, R_G$

$\rightarrow 65 = I_3\, 4{,}552 + (I_3 - I_2)\, 0{,}002 \rightarrow I_3 = \left(\frac{65}{4{,}552}\right) + \left(\frac{0{,}002}{4{,}552}\right) (I_3 - I_2)$

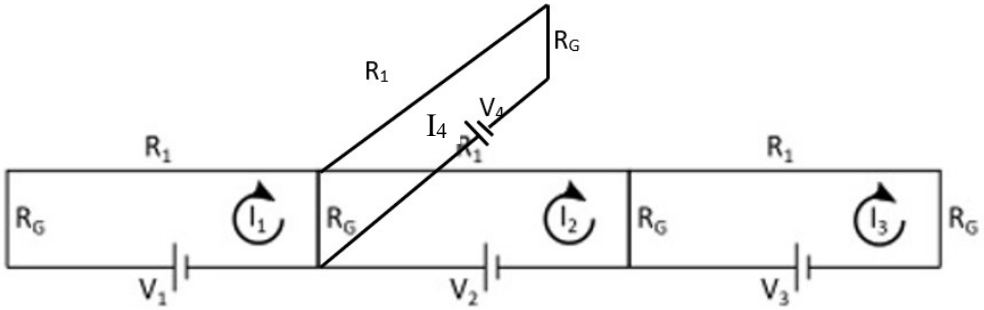
$\rightarrow I_3 = \left(\frac{65}{4{,}552}\right) + \left(\frac{0{,}002}{4{,}552}\right) (I_3 - I_2)$

$\rightarrow I_3 = 14{,}279 + (4{,}39 \times 10^{-4})\, (I_3 - I_2)$

$\rightarrow 0{,}999561\, I_3 = 14{,}279 - 4{,}39 \times 10^{-4}\, I_2$

$\rightarrow I_3 = 14{,}2853 - 4{,}39 \times 10^{-4}\, I_2$

Jadi dengan persamaan substitusi maka diperoleh $I_1 = 10{,}952\ A$, $I_2 = 8{,}889\ A$ dan $I_3 = 14{,}2892\ A$



***Gambar A.3.**, Ilustrasi rangkaian loop tunggal dengan pertemuan 3 jalur.*

Gambar A.3., menujukkan ilustrasi rangkaian loop tunggal dengan pertemuan 3 jalur rangkaian. Jika diketahui bahwa R_1 adalah R dan R_G adalah P, maka

Loop 1 (dengan I_1 dan I_4):

$V_1 = I_1 (R_1 + 2\, R_G) + (I_1 - I_4)\, R_1$

$= 2\, R\, I_1 + 2\, P\, I_1 + (-I_4)\, R$ (A-7)

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Loop 2 (dengan I_2 dan I_4):

$V_2 = I_2 (R_1 + 2 R_G) + (I_2 - I_4) R_1$

$= 2P I_2 + 2 R I_2 + R (-I_4)$ (A-8)

Loop 3 (dengan I_3):

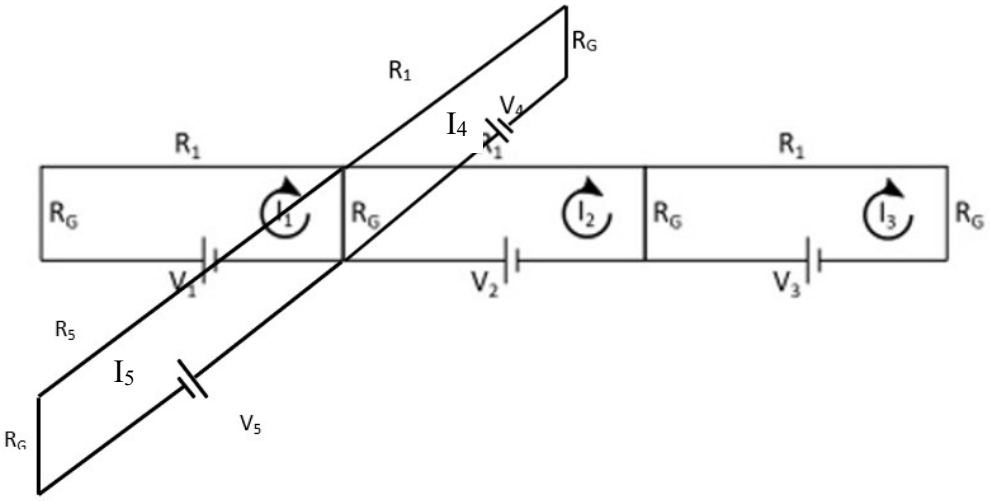
$V_3 = I_3 (R_1 + 2 R_G)$

$= 2 P I_3 + R I_3$ (A-9)

Loop 4 (dengn I_4)

$V_4 = I_4 (2 R_1 + 2 R_G) + (I_4 - I_1) R_1 + (I_4 - I_2) R_1$

$= 4 I_4 R + 2 I_4 P - (I_1 + I_2) R$ (A-10)



***Gambar A.4.**, Ilustrasi rangkaian loop tunggal dengan pertemuan 4 jalur.*

Gambar A.4., menunjukkan menunjukkan rangkaian loop tunggal dengan pertemuan 4 jalur. Jika diketahui bahwa $R_1 = R$ dan $R_G = P$

Loop 1:

$V_1 = I_1 (R_1 + 2 R_G) + (I_1 - I_2) R_G + (I_1 - I_4) R_1 + (I_1 - I_5) R_5$

$= 3 I_1 R + 3 I_1 P + (-I_2) P + (-I_4) R + (-I_5) R$ (A-11)

Loop 2:

$V2 = I_2 (R_1 + 2 R_G) + (I_2 - I_1) R_G + (I_2 - I_3) R_G + (I_2 - I_4) R_1$

$= 2 I_2 R + 4 I_2 P + (-I_3) P + (-I_1) P + (-I_4) R$ (A-12)

Loop 3:

$V_3 = I_3 (R_1 + 2 R_G) + (I_3 - I_2) R_G$

$= I_3 R + 3 I_3 P + (-I_2) P$

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Loop 4:

$$V_4 = I_4 (R_1 + 2R_G) + (I_4 - I_1) R_1 + (I_4 - I_2) R_1$$
$$= 3 I_4 R + 2 I_4 P + (-I_1) R + (-I_2) R \quad \text{(A-13)}$$

Loop 5 (diagonal):

$$V_5 = I_5 (R_5 + 2 R_G) + (I_5 - I_1) R_5$$
$$= 2 I_5 R + 2 I_5 P + (-I_1) R \quad \text{(A-14)}$$

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Tabel A3. *Daftar Manuskrip yang telah terbit dan sedang reviu (sudah disubmit) Tahun selama studi S3 Jurusan Fisika, FMIPA UGM (2024-2026)*

No	Judul Manuskrip	Penerbit/ Nama Jurnal	Nama Penulis	Status/ DOI
1	The Intensity of The Geomagnetic Storms Associated With IMF And Solar Wind Parameters During Solar Cycle 24	Earth and Planetary Physics 2025 Global Tinggi (Q1)	Anwar Santoso, Sismanto Sismanto, Eddy Hartantyo Rhorom Priyatikanto dan Dyah Rahayu Martiningrum	Terbit, Doi : 10.26464/epp2024069
2	Assessment of the severe geomagnetic storm on May 10-11, 2024 Effects on Geomagnetic Field and Ionosphere ovel the Indonesia Region	Rudarsko Geolosko Naftni Zbornik 2025 Global Menengah (Q2)	Anwar Santoso, Sismanto Sismanto, Eddy Hartantyo Rhorom Priyatikanto, Emanuel Sungging Mumpuni, La Ode M. Musafar K., Abdul Rachman, Erlansyah, Fitri Nuraeni, Erlansyah, Siska Filawati dan Dadang Nurmali	Terbit, DOI: 10.17794/rgn.2025.4.10
3	A Comparative Study on the Correlation of Geomagnetic Variations dB/dt between Low-Latitude Stations	Kyushu University 2024 Prosiding Internasional	Aznilinda Zainuddin, Muhammad Asraf Hairuddin, Zatul Iffah Abd Latiff, Anwar Santoso, Felipe Benavides, Ahmad Ihsan Mohd Yassin, Mohamad Huzaimy Jusoh	Terbit, https://doi.org/10.5109/7323260
4	Feature Reduction on *Sym-H* Index Image Using Principal Component Analysis Approach	MALAYSIAN JOURNAL OF APPLIED SCIENCES 2025, VOL 10 (1):65-75 E-ISSN:0127-9246 (ONLINE) 2025 Global terindeks	Aznilinda Zainuddin, Muhammad Asraf Hairuddin, Zatul Iffah Abd Latiff, Nur Dalila Khirul Ashar, Anwar Santoso, Mohamad Huzaimy Jusoh, Ahmad Ihsan Mohd Yassin	Terbit, http://dx.doi.org/10.37231/myjas.2025.10.1.432
5	CHARACTERIZING RADIATION BELT ELECTRON FLUX BEHAVIOR DURING GEOMAGNETIC STORMS DRIVEN BY CMEs AND CIRs	Proceeding Physics, Springer 2025 Prosiding Internasional	Anwar Santoso, Sismanto Sismanto, Eddy Hartantyo, Rhorom Priyatikanto, La Ode Muhammad Musafar Kilowasit, Mamat Ruhimat, Fitri Nuraeni, Mira Juangsih, Setyanto Cahyo Pranoto, Siska Filawati, Dadang Nurmali, Iskandar Bakri	Terbit, https://doi.org/10.1007/978-981-96-1344-1
6	Medan magnet Bumi dan peranannya	Karya Terpilih BRIN	Siska Filawati, Mira Juangsih, Visca	Terbit, ISBN: 978-602-6303-86-8 (e-

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	melindungi Bumi: Bagian buku "Keantariksaan untuk masyarakat dan kemajuan bangsa Sains dan Teknologi	2025 Buku Bunga Rampai	Wellyanita, Setyanto Cahyo Pranoto, Anwar Santoso, Elvina Ayu Ratnasari, Rizal Suryana dan La Ode Muhammad Musafar K.	book)
7	Toward GIC Hazard Model for Indonesia: Analyzing Latitudinal Effects of Geomagnetic Storms on the 210° Magnetic Meridian	Rudarsko Geolosko Naftni Zbornik (RGNZ) 2026 Global Menengah (Q2)	Setyanto Cahyo Pranoto, Anwar Santoso, Sismanto Sismanto, Eddy Hartantyo, Rhorom Priyatikanto, Nizam Ahmad, Silmie Vidiya Fani, Djohar Syams, Kuncoro Wisnu, Mario Batubara, Fitri Nuraeni, Siska Filawati, Muzirwan	Submit, 02-02-2026
8	Equatorial Amplification and GIC Risks in Indonesia: A Comparative Analysis of May and October 2024 Extreme Geomagnetic Storms	Earth and Planetary Physics (EPP) 2026 Global Menengah (Q1)	Anwar Santoso, Sismanto Sismanto, Eddy Hartantyo, Rhorom Priyatikanto, Nizam Ahmad, Erlansyah, Mario Batubara, Slamet Supriadi, Rizal Suryana, Setyanto Cahyo Pranoto, Emanuel Sungging Mumpuni, Asnawi Husin, Mira Juangsih, and Annis Siradj Mardiani	Submit : 27-01-2026
9	Expected Geomagnetically Induced Currents in Low Latitudes During Severe Storms in 2024: A Case Study of Indonesia's Java-Madura-Bali Power System (JAMALI)	Advances in Space Research 2025 Global Menengah (Q1)	Anwar Santoso, Sismanto Sismanto, Eddy Hartantyo, Rhorom Priyatikanto, Mohammad Huzaimy Jusoh, Setyanto Cahyo Pranoto, Peberlin Sitompul, Mira Juangsih, and Kuncoro Wisnu	Submit: 27-09-2025
10	Short-Term Forecast of Geomagnetic Variations over Indonesia for Space Weather Monitoring	Advances in Space Research 2025 Global Menengah (Q1)	La Ode Muhammad Musafar Kilowasid, Sismanto Sismanto, Dian Yudha Risdianto, Erlansyah Erlansyah, Muhammad Farchani Rosyid, Nizam Ahmad, Angga Yolanda Putra, Fitri Nuraeni, Muzirwan Muzirwan, Visca Wellyanita, Nia Syafitri, Anwar Santoso	Submit: 15-12-2025

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11	Infrasound and Geo-magnetic Observations of the April 22, 2025, M5.6 Earthquake South of Bandung, West Java	Journal of Vibration Engineering & Technologies 2026 Global Menengah (Q1)	Mario Batubara, Anwar Santoso, Asnawi Husin and Muhammad Syrojudin	Submit: 07-01-2026