WEBINAR SERI 022

Professional Meeting of Continuing Professional Development Program for Construction Service Actors
Pertemuan Profesi Program Pengembangan Keprofesian Berkelanjutan untuk Para Pelaku Jasa Konstruksi

Regional Leadership Council of the Indonesian Association of Construction Experts of Yogyakarta (DPD ATAKI DIY) together with the Regional Leadership Board of the National Association of Construction Entrepreneurs of the Special Region of Yogyakarta (DPAS DIY) provides :
Dewan Pimpinan Daerah Asosiasi Tenaga Ahli Konstruksi Indonesia Daerah Istimewa Yogyakarta (DPD ATAKI DIY) bersama Dewan Pimpinan Daerah Gabungan Pengusaha Kontraktor Nasional Indonesia Daerah Istimewa Yogyakarta (DPD GAPEKNAS DIY) memberikan:

CERTIFICATE/SERTIFIKAT

SOB_02200010000117102020

To / Kepada

Prof. Dr. Ir. Antonius, M.T.

As / Sebagai

Speaker/Narasumber

On the BARRATAGA-ATAKI-GAPEKNAS Webinar, series 022 entering the topics of / Pada webinar BARRATAGA-ATAKI-GAPEKNAS seri 022 dengan mengikuti topik-topik:

1. *Simulation of Bridge Pillar Ductility Based on Existing Confine Models (Series 1) /* Simulasi Daktilitas Pilar Jembatan Berdasarkan Model-Model Kekangan Eksisting (Seri 1) **Prof. Dr. Ir. Antonius, MT**

2. *Management of Implementation and Maintenance for Road Infrastructures (Series 1) /* Manajemen Pelaksanaan dan Pemeliharaan Infrastruktur Jalan (Seri 1) **Dr. Ir. I Dewa Made Alit Karyawan, MT**

3. *Risks in Road Infrastructure Development in Papua Region (Series 1) /* Risiko Pembangunan Infrastruktur Jalan Di Wilayah Papua (Seri 1) **Dr. Dewi Ana Rusim, ST., MT.**

4. *Knitting of Presentation Materials by a Team member of Professors and Experts /* Merajut Materi Presentasi oleh Anggota Tim Gurubesar dan Pakar **Prof.Ir.H.Sarwidi.MSCE.,Ph.D., A-Utama, Man.Hunian.**

Score / Bobot / Nilai

Five SKPK / 5 (Lima) SKPK

Zoom Conference Yogyakarta, 17 Oktober 2020

DPD ATAKI DIY

Prof.Ir.H.Sarwidi,MSCE.,Ph.D.,AU
Ketua

DPD GAPEKNAS DIY

DR.Drg.H.Bambang Widayanto,SKG.,MBA
Ketua Umum

DPD – D.I YOGYAKARTA
GAPEKNAS

BARRATAGA

ATAKI
www.ataki.org

Nomor : 022-1/SPNS/GAPEKNAS-ATAKI/X/2020
Lampiran : 1 (satu) berkas
Perihal : Permohonan sebagai Narasumber

Kepada Yth :
Bapak Prof. Dr. Ir. Antonius, MT.
Gurubesar Teknik Sipil, Unissula, Semarang
Di
Tempat

Assalamu'allaikum warohmatullahi wabarokatuh

Pandemi Covid 19 telah membatasi interaksi konvensional yang biasa dilakukan interkasi secara fisik antar manusia. Namun dengan menerapkan teknologi komunikasi 4.0, interaksi secara fisik konvensional dapat dirubah menjadi interkasi modern secara maya, berkenaan dengan hal tersebut DPD ATAKI DIY bersama DPD GAPEKNAS DIY yang didukung Komunitas BARRATAGA menyelenggarakan Seminar Online / Pertemuan Profesi Program Pengembangan Keprofesian Berkelanjutan (PPKB) bagi para pelaku dan tenaga ahli di bidang jasa konstruksi**,** oleh katena itu kami mohon kesediaan **Bapak Prof. Dr. Ir. Antonius, MT.** berkenan menjadi salah satu Narasumber dalam acara tersebut. Rencananya acara akan dilaksanakan pada:

Hari/Tanggal : Sabtu, 17 Oktober 2020
Waktu : 07.30 s.d 12.00 WIB
Tempat : Online Zoom conference
Meeting Id : (Menyusul)
Password : (Menyusul)
Link Meeting : Request via HP/WA +6283106569741
Kontak person : **Silvi Indriati** (0857-9926-9929)
Tsani Kuswara (0821-3497-2944)

Demikian surat permohonan narasumber ini kami sampaikan, atas perhatian serta perkenannya kami menghaturkan banyak terimakasih.

Wassalamualaikum warohmatullahi wabarokatuh.

Yogyakarta, 05 Oktober 2020

DPD GAPEKNAS DIY

DR.Drg.H.Bambang Widayanto,SKG.,MBA.
Ketua Umum

DPD ATAKI DIY

Prof.Ir.H.Sarwidi,MSCE.,Ph.D.,A-U.
Ketua

Sekretariat : Jl. Tanjung No. 4 Condongcatur, Depok, Sleman, D.I Yogyakarta
Telp/ Fax : 0274- 881 552 , Email : diygapeknas@gmail.com, atakiyk@gmail.com
CP : 081391528098 (Nuha Borninusa) ; 085799269929 (Silvie Indriati)

DPD – D.I YOGYAKARTA
GAPEKNAS

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SUSUNAN ACARA

SEMINAR ONLINE BARRATAGA® SERI 022

*ZOOM Conference "**Dari Jogja untuk Indonesia**". Sabtu, 17 Oktober 2020*

WAKTU`	KEGIATAN
07.30 – 08.00	Registrasi dan Koordinasi Data Peserta
08.00 – 08.25	**Pembukaan**
	Sambutan 1 **Bpk. DR. Drg. H. Bambang Widayanto, SKG., MBA** (Ketua Umum DPD GAPEKNAS DIY) didampingi oleh **Prof. Ir. H. Sarwidi, MSCE., Ph.D., A-Utama, Man. Hunian**, (Ketua DPD ATAKI DIY)
	Sambutan 2 (Sekaligus membuka Cara) **Bpk. Ir. Manahara R. Siahaan** (Ketua Umum DPP ATAKI & DPP GAPEKNAS)
Sesi 1 Topik 01 08.25 - 09.15	**SIMULASI DAKTILITAS PILAR JEMBATAN BERDASARKAN MODEL-MODEL KEKANGAN EKSISTING (SERI 1)** **Prof. Dr. Ir. Antonius, MT**. Gurubesar Teknik Sipil, Unissula, Semarang
09.15 – 09.20	**Foto Bersama Sesi 1**
Sesi 2 Topik 02 09.20 – 10.10	**MANAJEMEN PELAKSANAAN DAN PEMELIHARAAN INFRASTRUKTUR JALAN (SERI 1)** **Dr. Ir. I Dewa Made Alit Karyawan, MT.** Dosen Jurusan Teknik Sipil Universitas Mataram, NTB, dan Praktisi Konstruksi
10.10 – 10.15	**Foto Bersama Sesi 2**
Sesi 3 Topik 03 10.15 – 11.05.	**RISIKO PEMBANGUNAN INFRASTRUKTUR JALAN DI WILAYAH PAPUA (SERI 1)** **Dr. Dewi Ana Rusim, ST., MT**. Dosen Jurusan Teknik Sipil Universitas Cenderawasih, Jayapura
11.05 – 11.10	**Foto Bersama Sesi 3**
Sesi 4 Khusus 11.10 – 11.55	**MERAJUT MATERI PRESENTASI OLEH TIM GURUBESAR DAN PAKAR** **Prof. Ir. H. Sarwidi, MSCE., Ph.D., A-Utama, Man. Hunian** Pengarah BNPB RI, Inventor & Inovator BARRATAGA®, Gurubesar Senior Rekayasa Kegempaan UII, Ketua DPD ATAKI DIY
11.55 – 12.00	**Pengumuman dan Penutupan** **Ir Dwi Santoso MT** (Ketua Panitia Pelaksana)

Sekretariat : Jl. Tanjung No. 4 Condongcatur, Depok, Sleman, D.I Yogyakarta
Telp/ Fax : 0274- 881 552 , Email : diygapeknas@gmail.com, atakiyk@gmail.com
CP : 081391528098 (Nuha Borninusa) ; 085799269929 (Silvie Indriati)

SIMULASI DAKTILITAS PILAR JEMBATAN BERDASARKAN MODEL-MODEL KEKANGAN EKSISTING

Prof. Dr. Ir. Antonius, MT

Fakultas Teknik – Jurusan Teknik Sipil
Universitas Islam Sultan Agung (UNISSULA)
Semarang

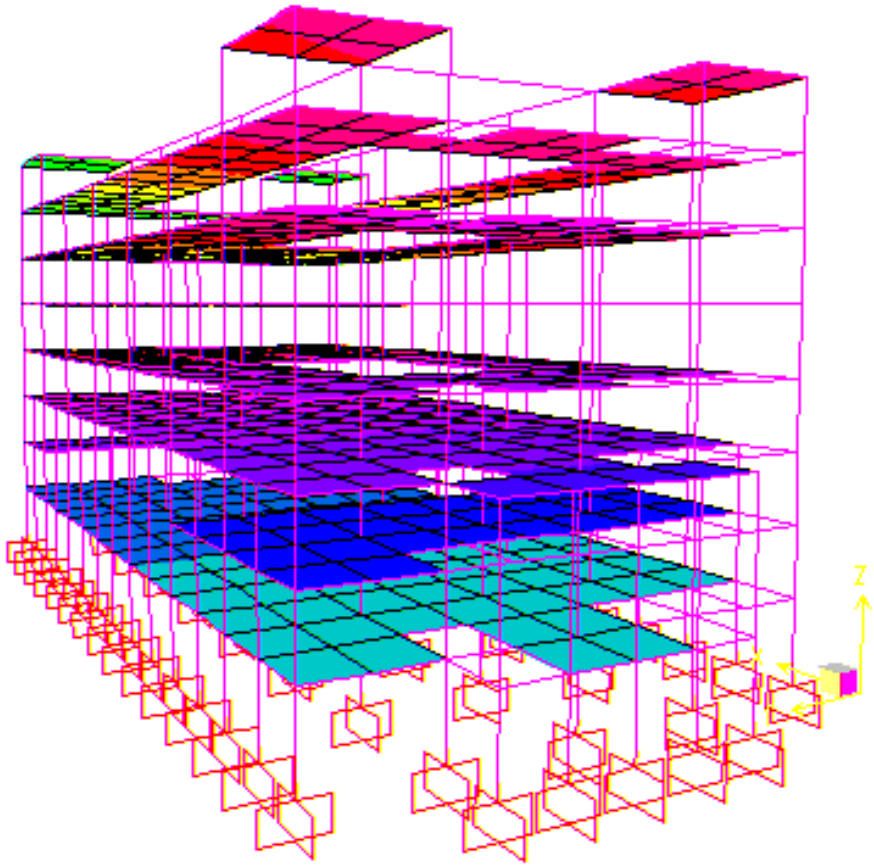
WEBINAR BARRATAGA SERI 022: Teori manajemen Konstruksi & Rekayasa, Struktur Beton, Jalan dan Jembatan pada Proyek Konstruksi, ZOOM Conference. Sabtu, 17 Oktober2020

Latar belakang

Taiwan 1999

India 2001

Wenchuan 2008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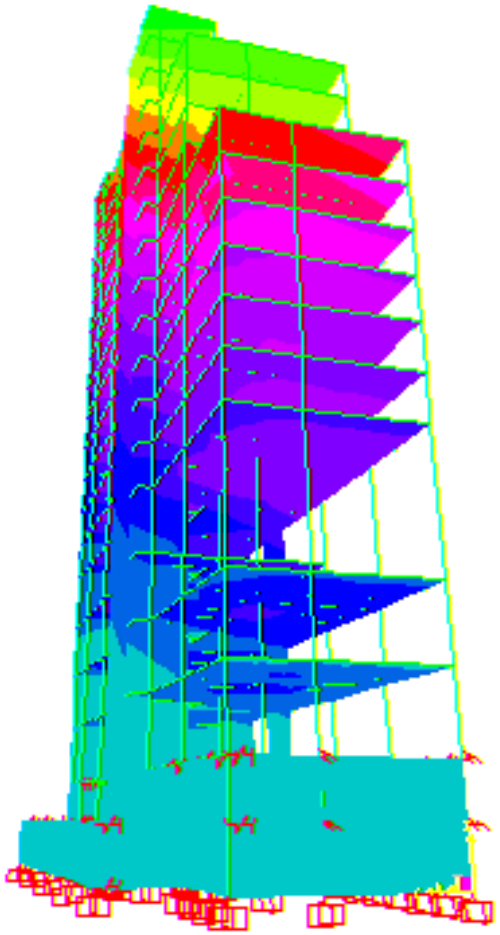
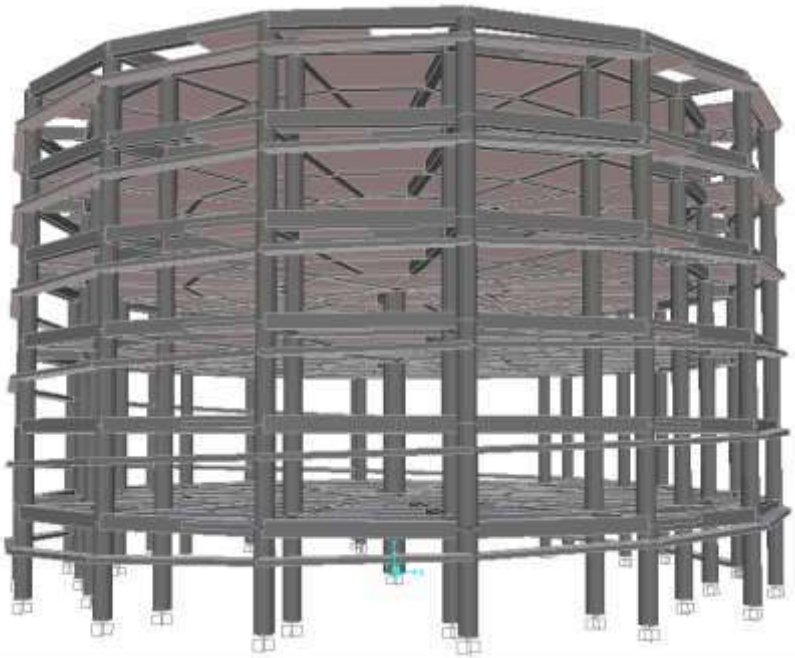
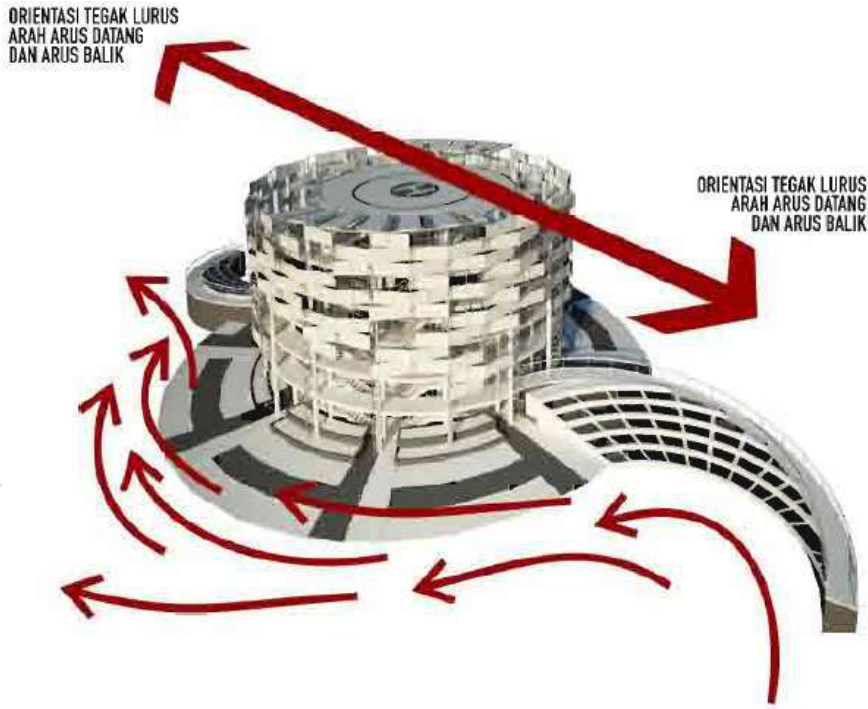
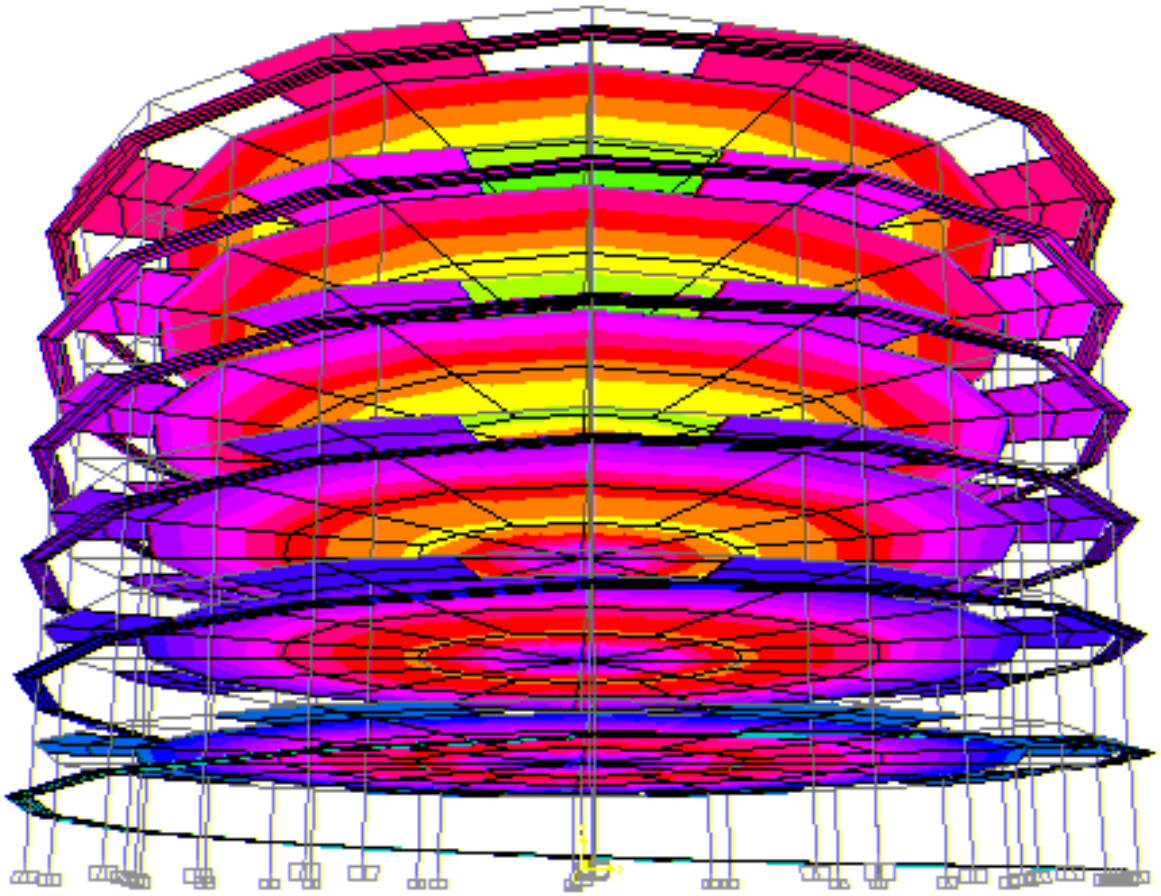


IDEALISASI SISTEM STRUKTUR

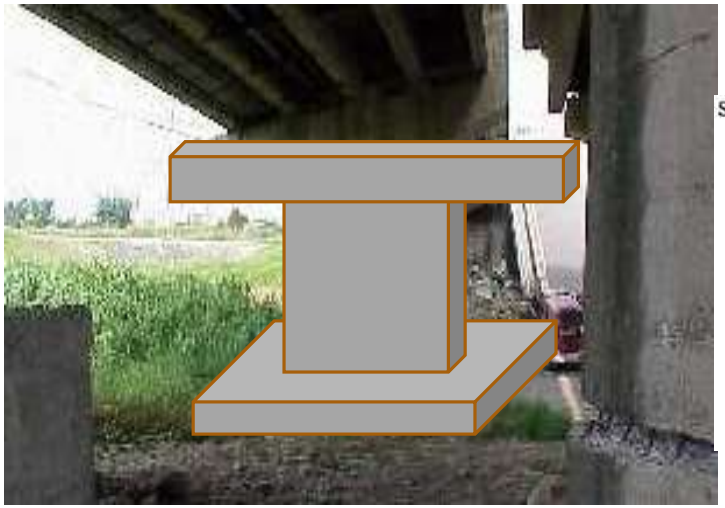


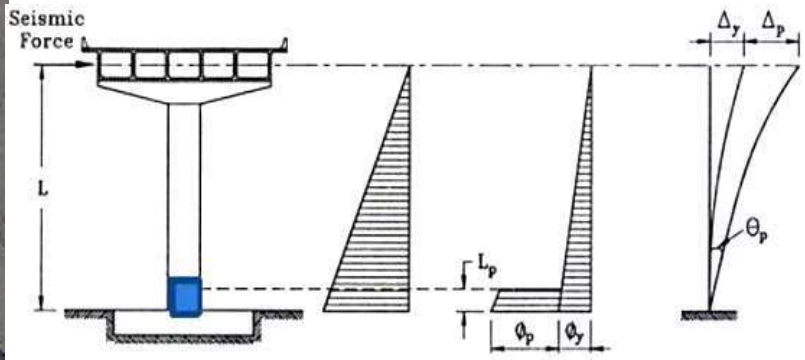




Perilaku Seismik pada Pilar Jembatan

- In the seismic design of RC columns of building and bridge piers, the potential plastic hinge regions need to be carefully detailed for ductility in order to ensure that the shaking from large earthquakes will not cause collapse [Antonius et al., 2013]

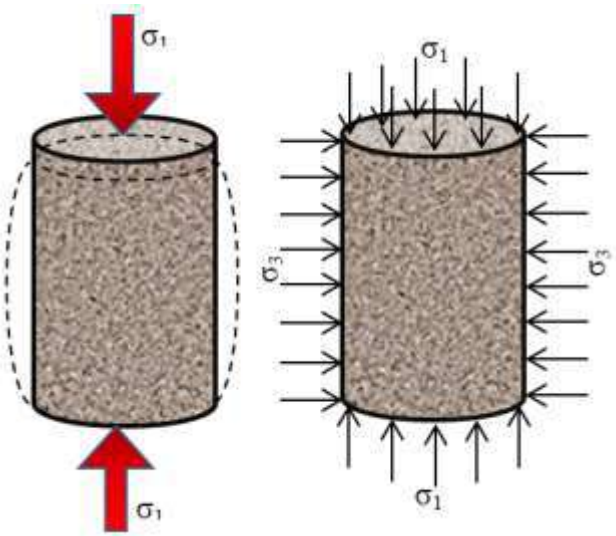




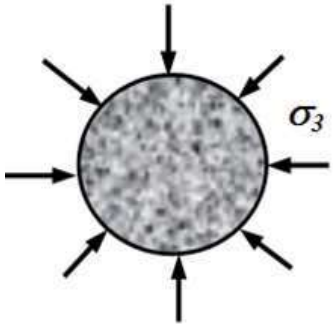
- Most important design consideration for ductility of plastic hinge regions of RC columns with provided of confinement, to prevent buckling of the longitudinal bars and to prevent of shear failure

Dasar Teori:

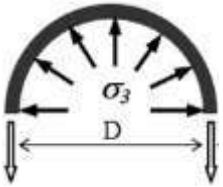
Perilaku beton terhadap beban triaksial



a) Beban uniaksial dan pengekangan pada silinder beton

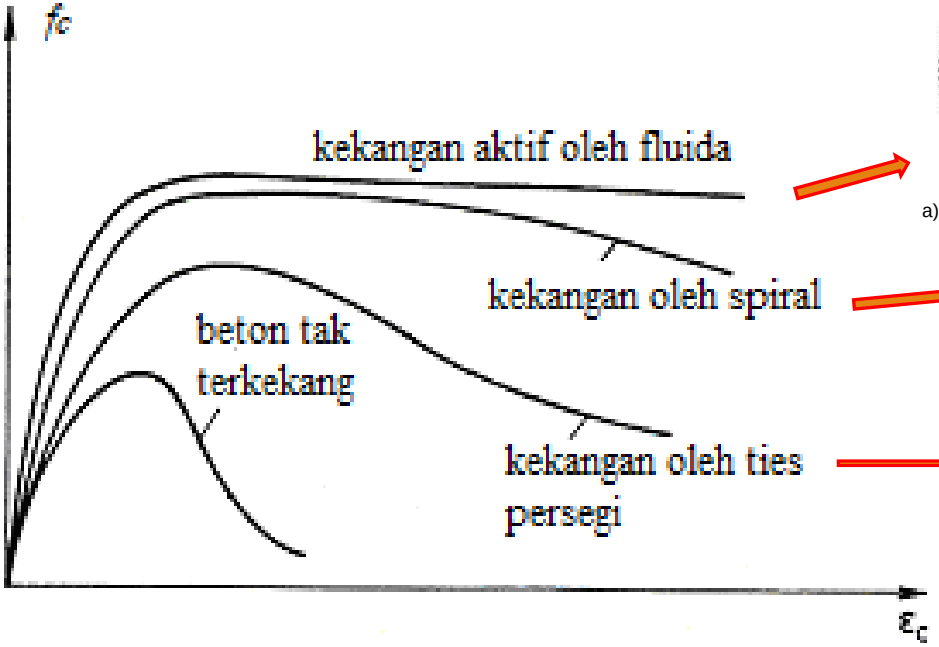


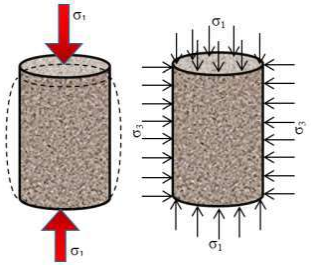
b) Tegangan lateral pada penampang inti



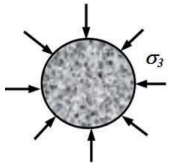
c) Aksi busur kekangan spiral

Hubungan Beban-defleksi kolom dengan variasi sengkang

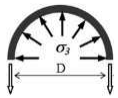




a) Beban uniaksial dan pengekangan pada silinder beton



b) Tegangan lateral pada penampang inti



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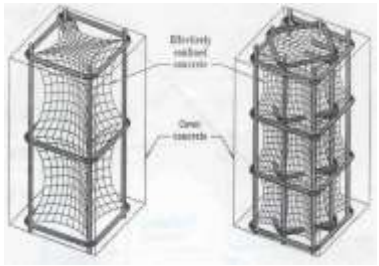
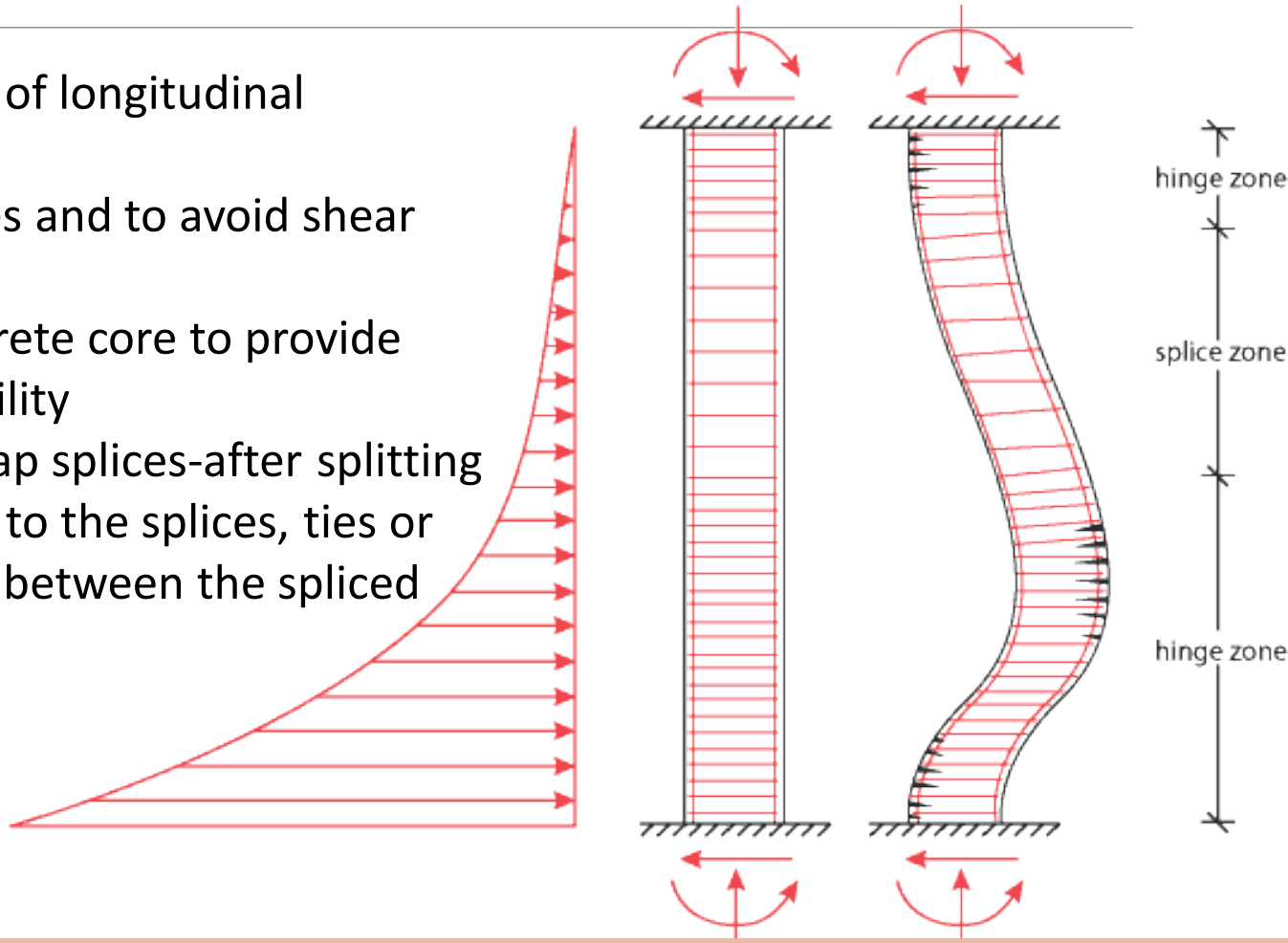
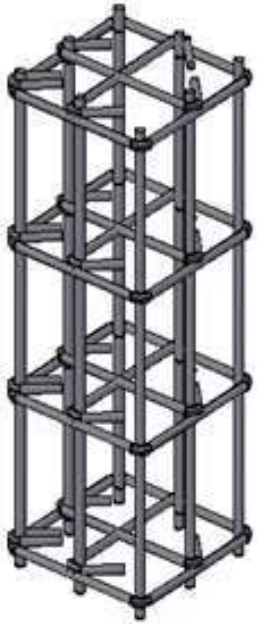
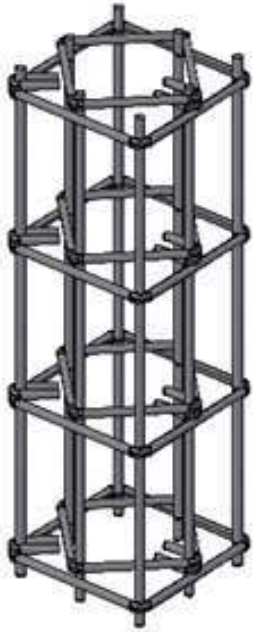


Tujuan Tulangan Pengekang

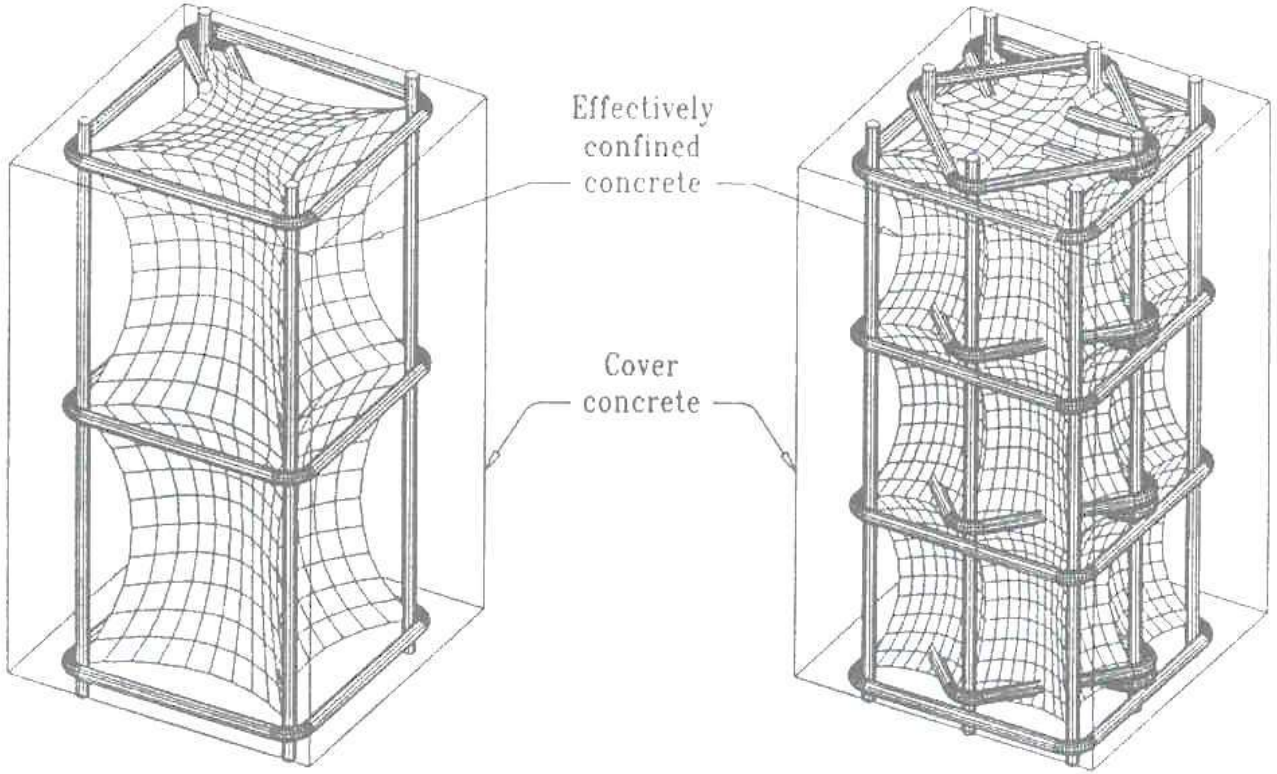
- To prevent buckling of longitudinal reinforcement bars
- To resist shear forces and to avoid shear failure
- To confine the concrete core to provide sufficient deformability
- To clamp together lap splices-after splitting cracks form parallel to the splices, ties or spirals restraint slip between the spliced bars



Konfigurasi Tulangan

			
(a) Sengkang bulat/hoop	(b) Sengkang konfigurasi sederhana/bulat	(c) Sengkang gabungan konfigurasi biasa dan silang	(d) Sengkang gabungan konfigurasi biasa dan diamon

EFEKTIFITAS KEKANGAN PENAMPANG PERSEGI



SNI 2833:2008 → Untuk Jembatan

- Beban Statik

  Circular section: $$\rho_s = 0.45\left(\frac{A_g}{A_c} - 1\right)\frac{f'_c}{f_y}$$

  Rectangular section: $$A_{sh} = 0.3sh_c\,\frac{f'_c}{f_{yh}}\left(\frac{A_g}{A_c} - 1\right)$$

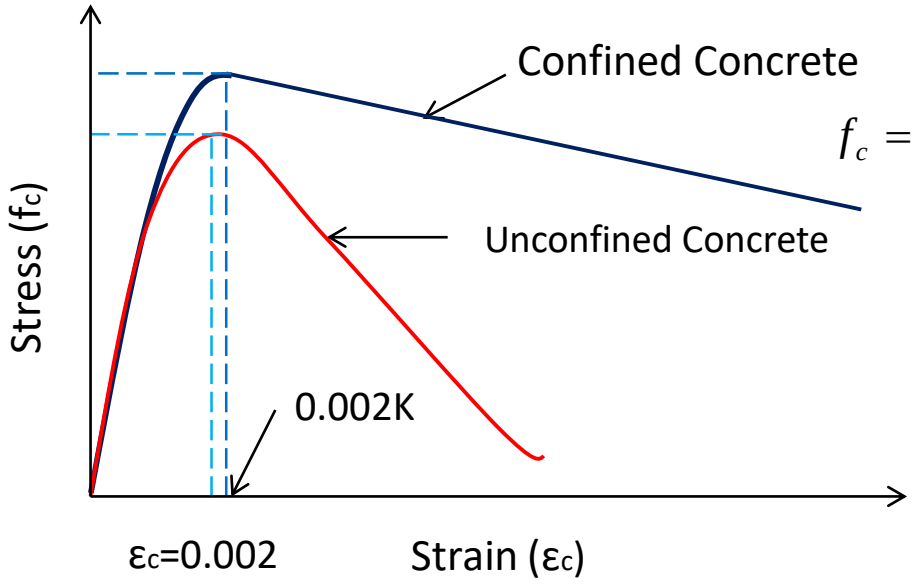
- Beban Seismik

  Circular section: $A_g/A_c \leq 1{,}27$ → $$\rho_s = 0{,}12\,\frac{f_c'}{f_y}$$

  Rectangular section: $A_g/A_c \leq 1{,}3$ → $$A_{sh} = 0{,}09.s.d_c\,\frac{f_c'}{f_y}$$

Model-model Kekangan

Model Scott et al. 1982



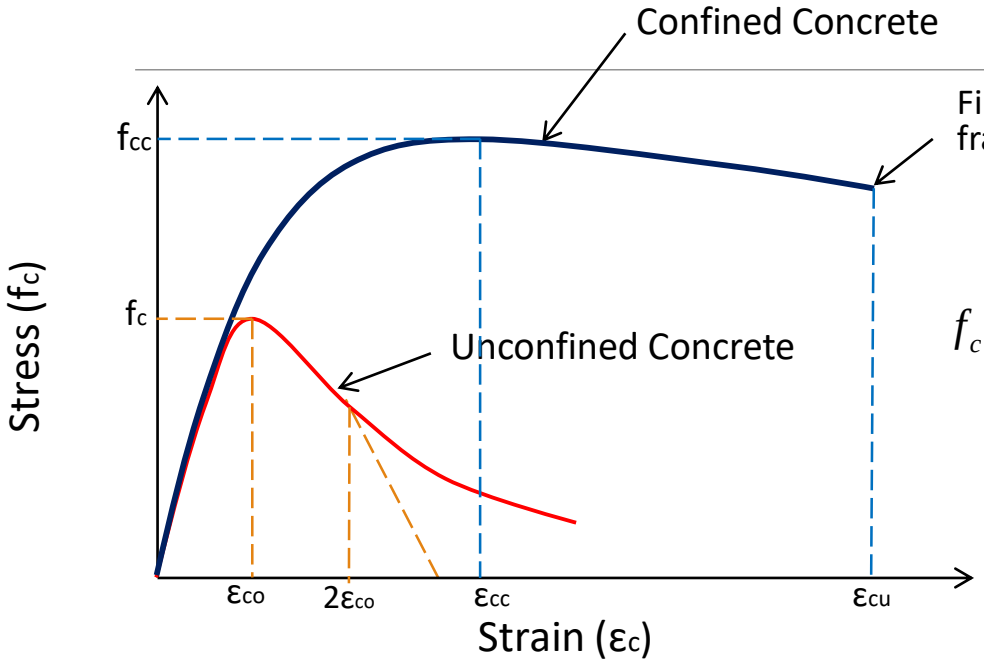
$$f_c = Kf'_c\left[\frac{2\varepsilon_c}{0.002K} - \left(\frac{\varepsilon_c}{0.002K}\right)^2\right];\ \varepsilon_c \le 0.002K$$

$$f_c = Kf'_c\left[1 - Z_m\left(\varepsilon_c - 0.002K\right)\right];\ \varepsilon_c > 0.002K$$

$$K = 1 + \frac{\rho_s f_{yh}}{f'_c}$$

$$Z_m = \frac{0.5}{\frac{3 + 0.29 f'_c}{145 f'_c - 1000} + \frac{3}{4}\rho_s\sqrt{\frac{h''}{s_h}} - 0.002K}$$

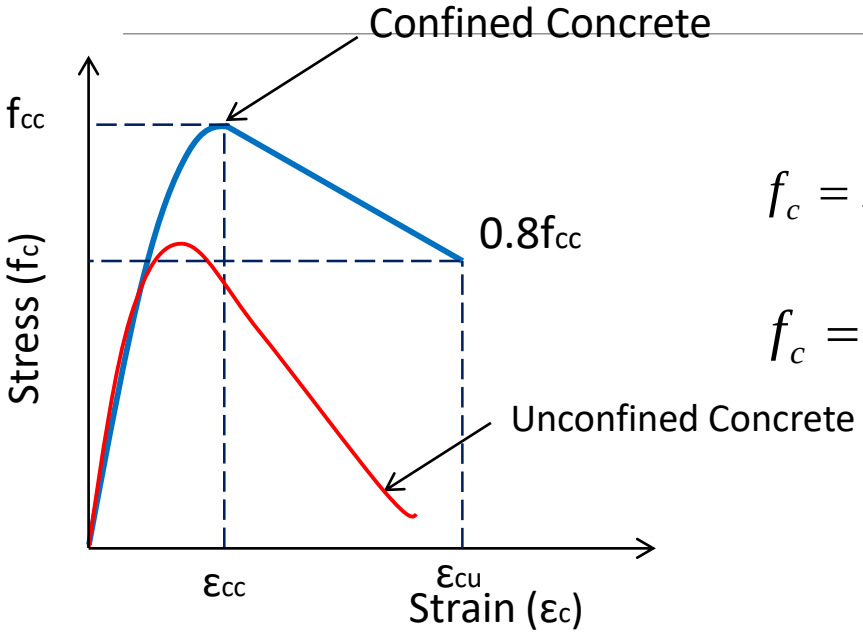
Model Mander et al. (1988)



$$f_c = \frac{f'_{cc}\, xr}{r - 1 + x^r} \quad ; \varepsilon_{cc} = \varepsilon_{co}\left[1 + 5\left(\frac{f'_{cc}}{f'_{co}} - 1\right)\right]$$

$$f'_{cc} = f'_{co}\left(-1.254 + 2.254\sqrt{1 + \frac{7.94 f'_l}{f'_{co}}} - 2\frac{f'_l}{f'_{co}}\right)$$

Model Hoshikuma, J., Kawashima, K. (1997)



$$f_c = E_c \varepsilon_c \left\{ 1 - \frac{1}{n} \left(\frac{\varepsilon_c}{\varepsilon_{cc}} \right)^{n-1} \right\}$$ Ascending branch

$$f_c = f'_{cc} - E_{des} \left(\varepsilon_c - \varepsilon_{cc} \right)$$ Descending branch

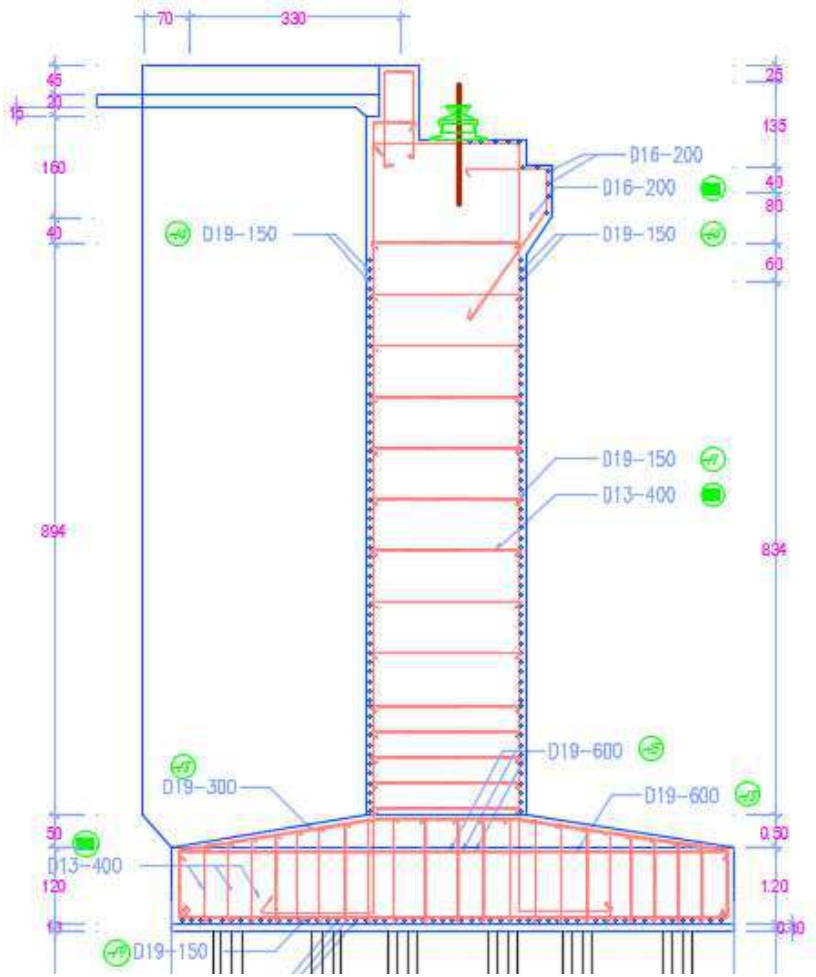
$$f'_{cc} = f'_c + 3.8 \alpha \rho_s f_{yh}$$

$$E_{des} = 11.2 \frac{f'^{\,2}_c}{\rho_s f_{yh}}$$

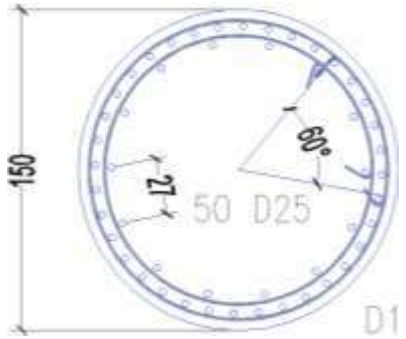
Where,
α=1.0 and β=1.0 : circular sections,
α=0.2 and β=0.4: rectangular sections

$$\varepsilon_{cc} = 0.002 + 0.033 \beta \frac{\rho_s f_{yh}}{f'_c}$$

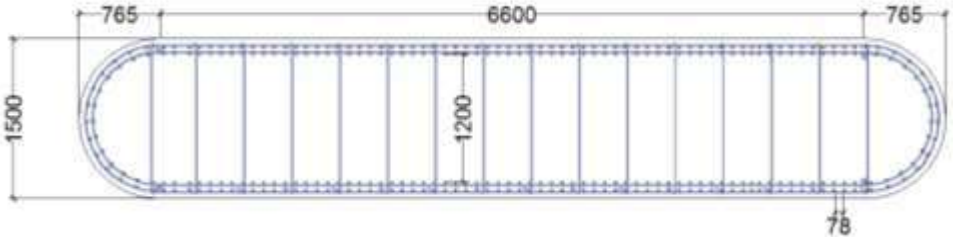
Studi kasus



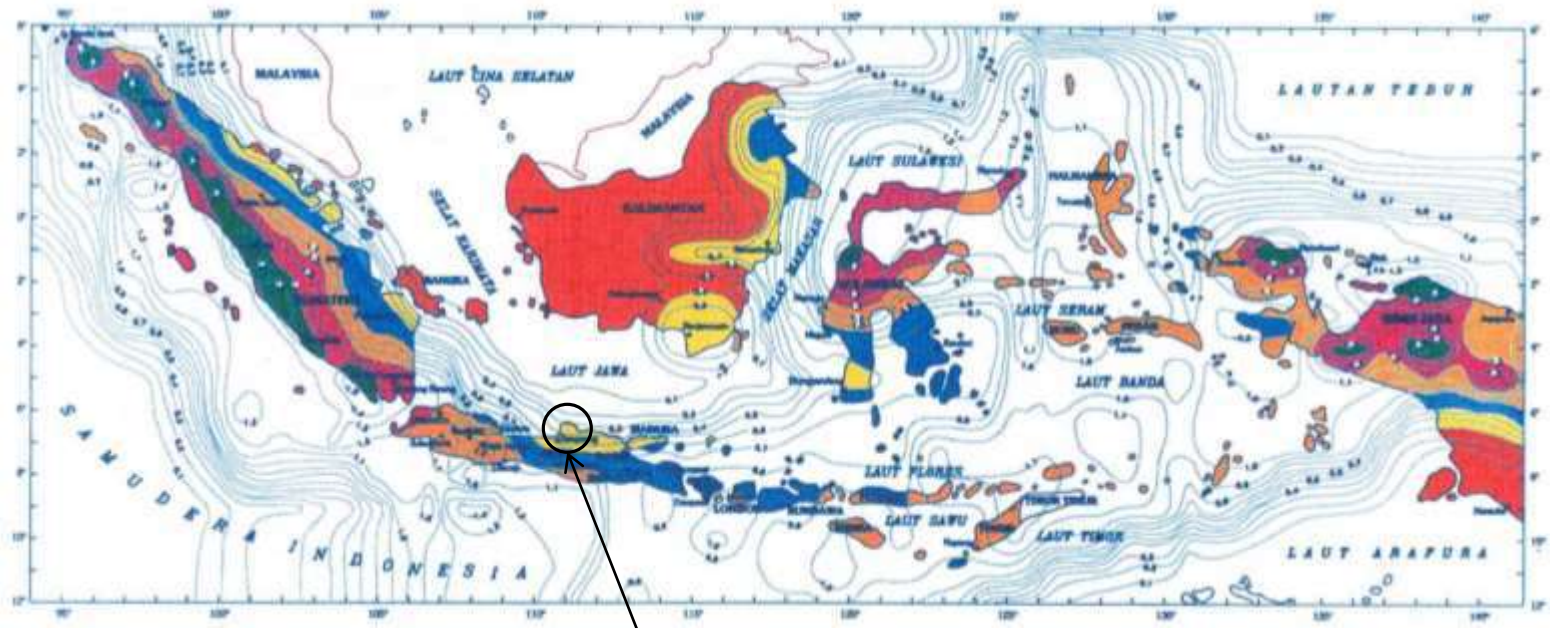
Penampang pilar jembatan Greenwood



Penampang pilar jembatan Srowol



Peta Gempa untuk jembatan SNI 2833:2008

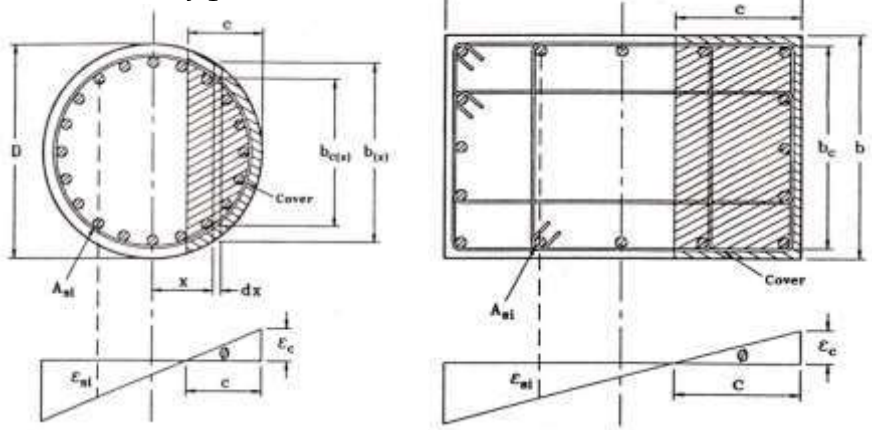


Greewood, Semarang and Srowol, magelang

Moment-Curvature Analysis

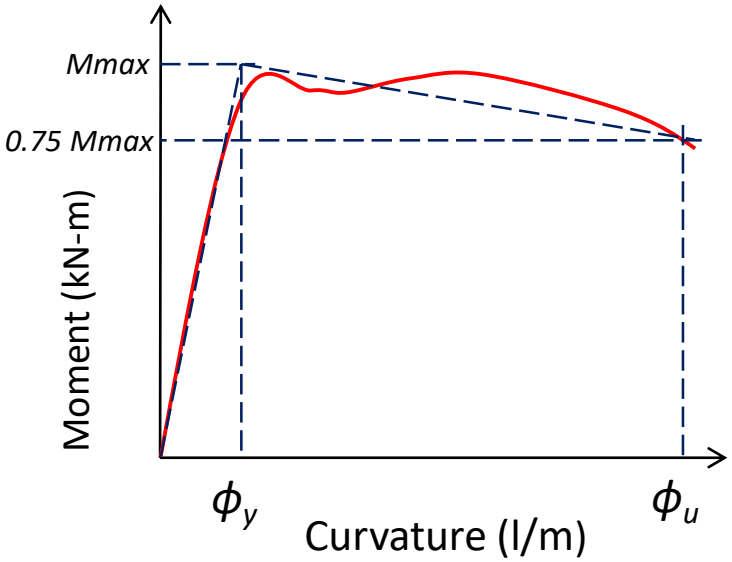
Moment equilibrium,

$$M = \int_{x=(D/2)-c}^{D/2} \left[b_{c(x)} f_c(\varepsilon_x) + \left(b_{(x)} - b_{c(x)}\right) f_{cu}(\varepsilon_x) \right] x dx + \sum_{i=1}^{n} A_{si} f_s(\varepsilon_{xi}) x_i$$



And the curvature is

$$\phi = \frac{\varepsilon_c}{c}$$



And the Ductility curvature is

$$\mu = \frac{\phi_u}{\phi_y}$$

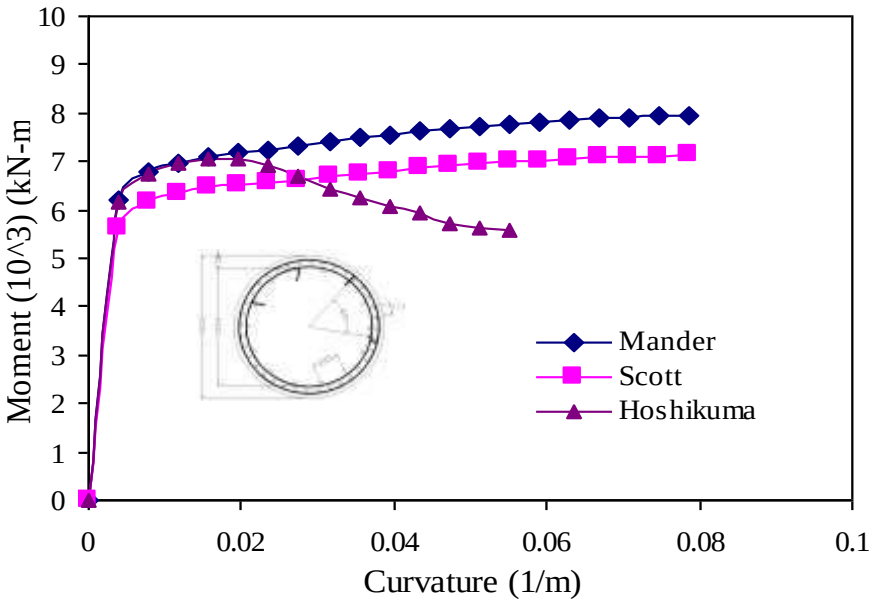
Definisi:

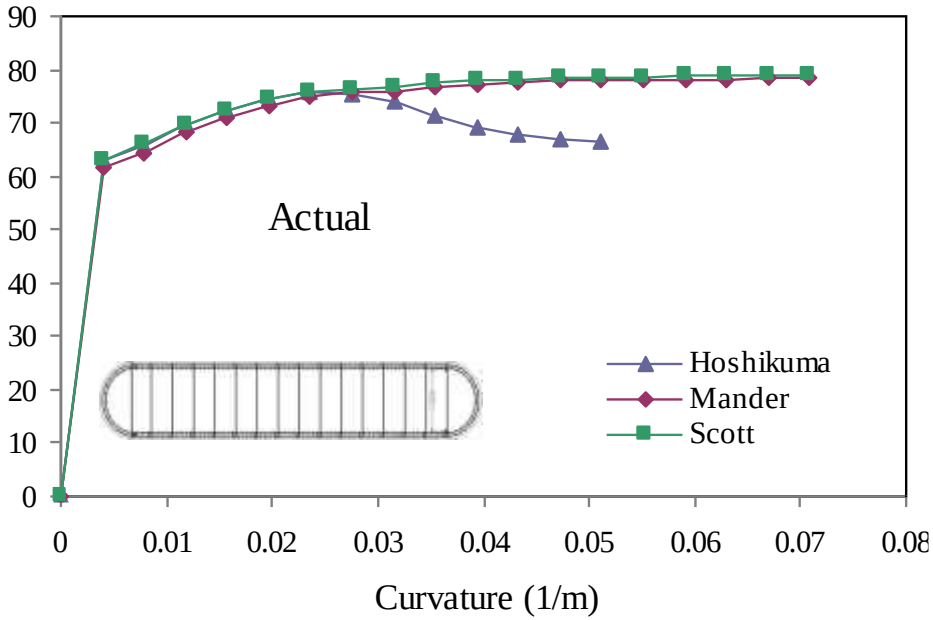
Sharma et al (2005) : daktilitas kurvatur struktur pilar jembatan tahan gempa setidaknya bernilai 16

Hasil

Piers bridge	Confining steel			Long. steel	Curvature ductility (μ)		
	D -s	f_y (MPa)	Volumetric ratio (ρ)		Scott	Mander	Hoshikuma
Greenwood (Bulat)	13-150	320	0.5	50D25	17.6	17.6	11.9
Srowol (Dinding)	16-150	320	0.5	240D22	16.8	15.4	10.9

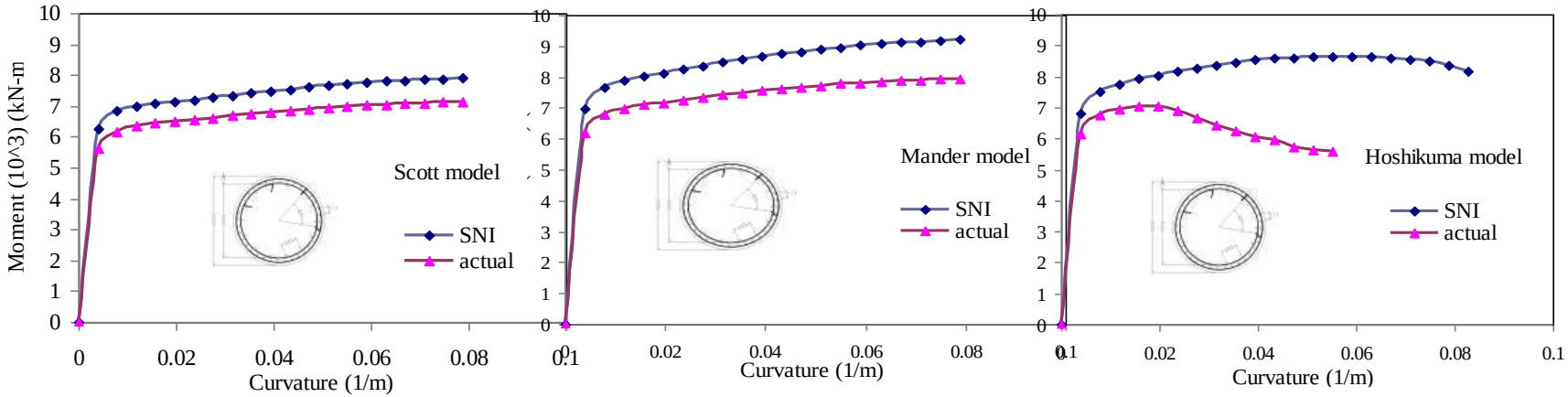
Hasil moment vs kurvatur



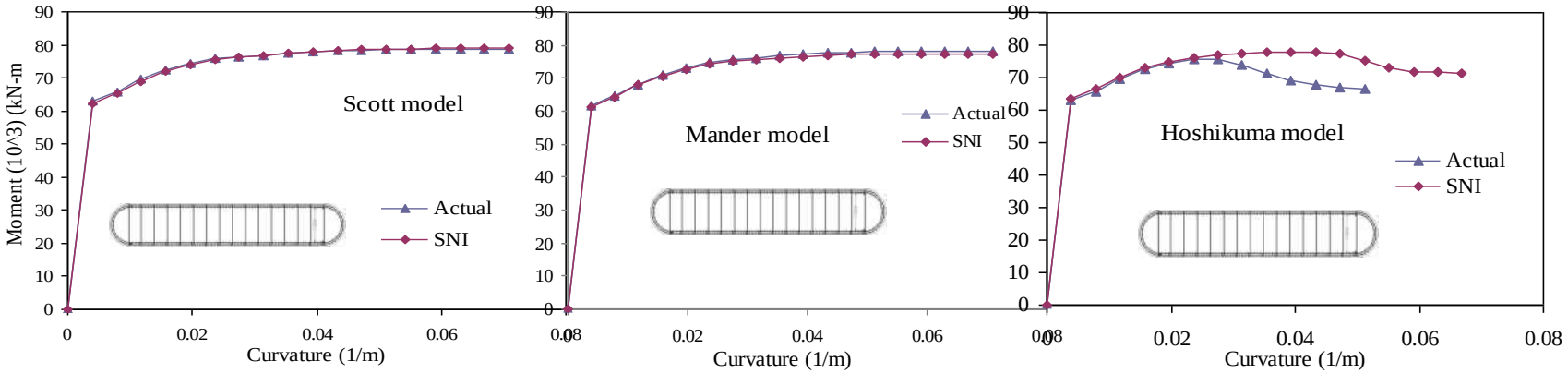


Perbandingan perilaku Moment-curvature model-model kekangan Scott, Mander, dan Hoshikuma

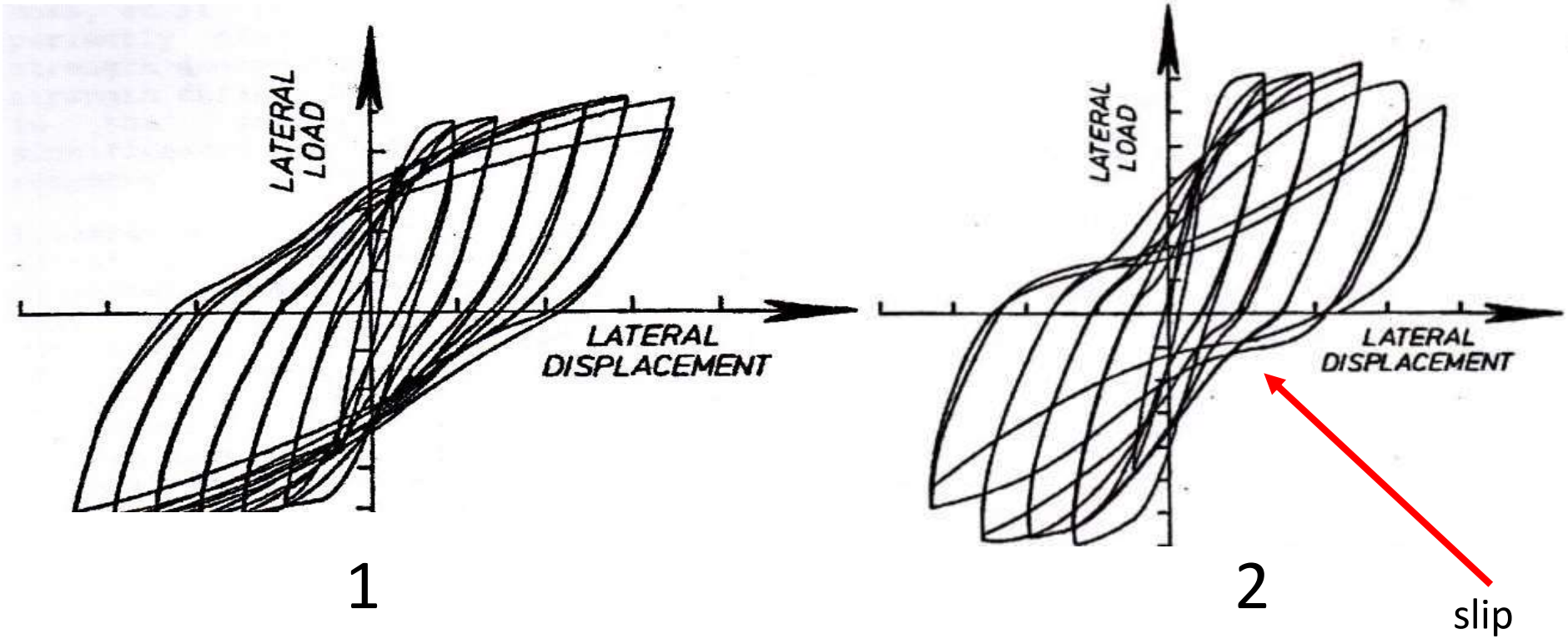
Greenwood bridge



Srowol bridge



Perilaku seismik

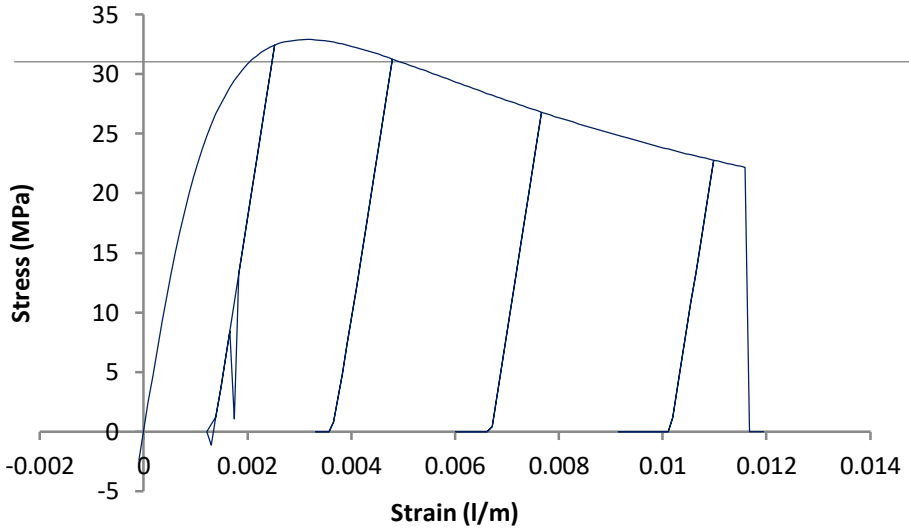


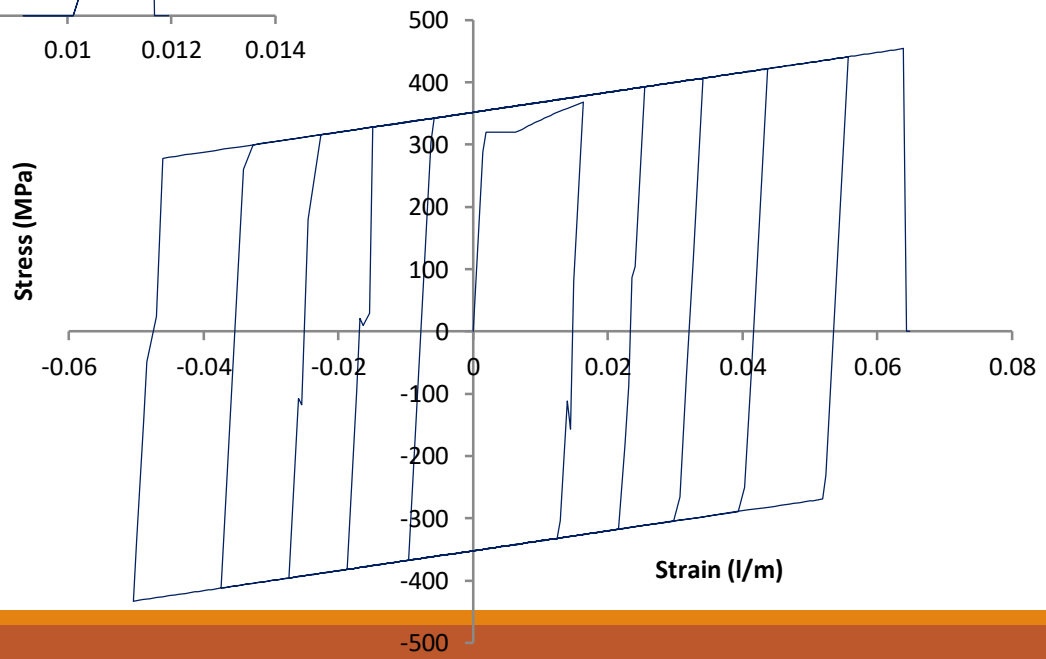
1

2

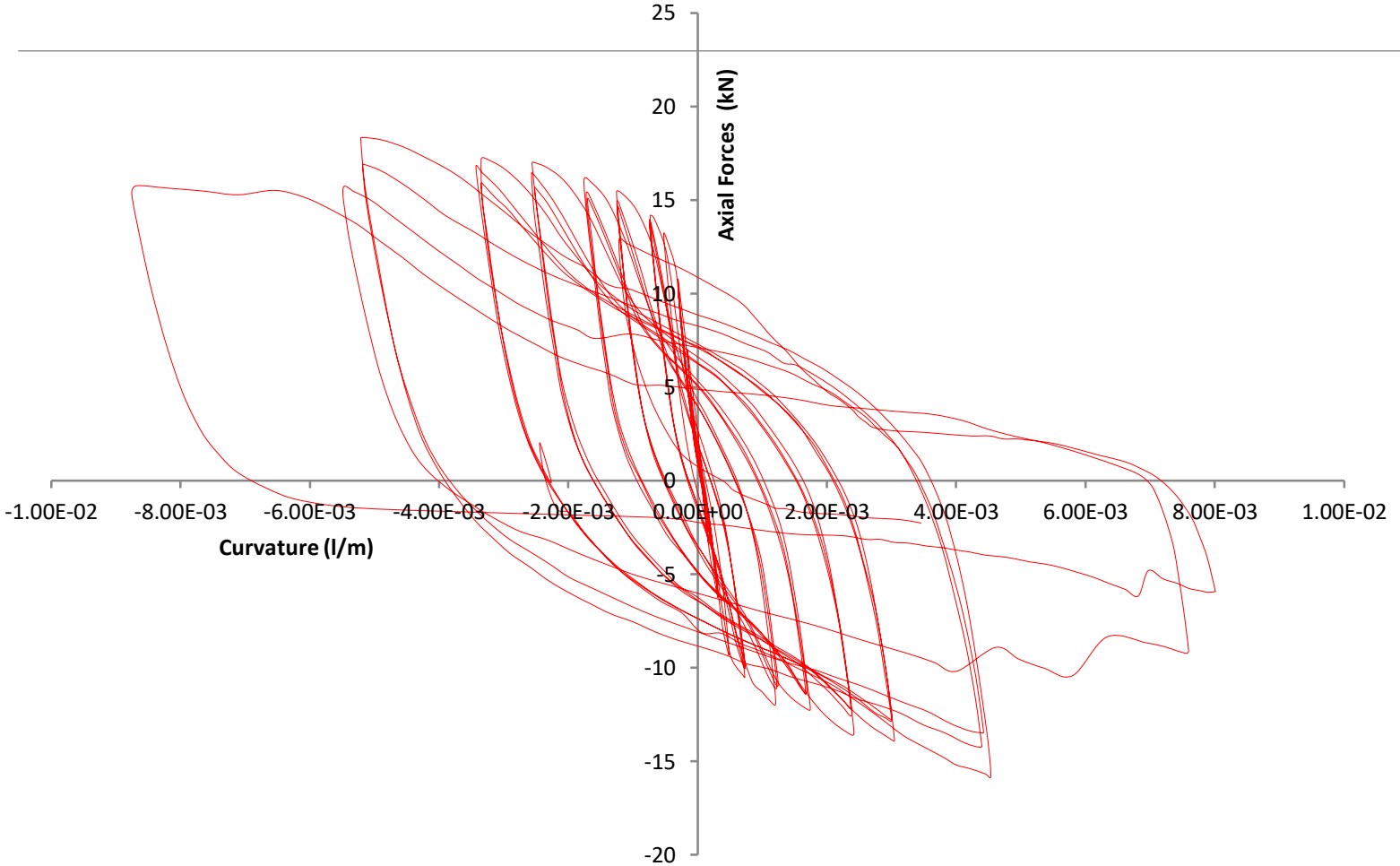
Daktilitas $\mu_1 > \mu_2$

Simulasi beban seismik i.e. model Mander

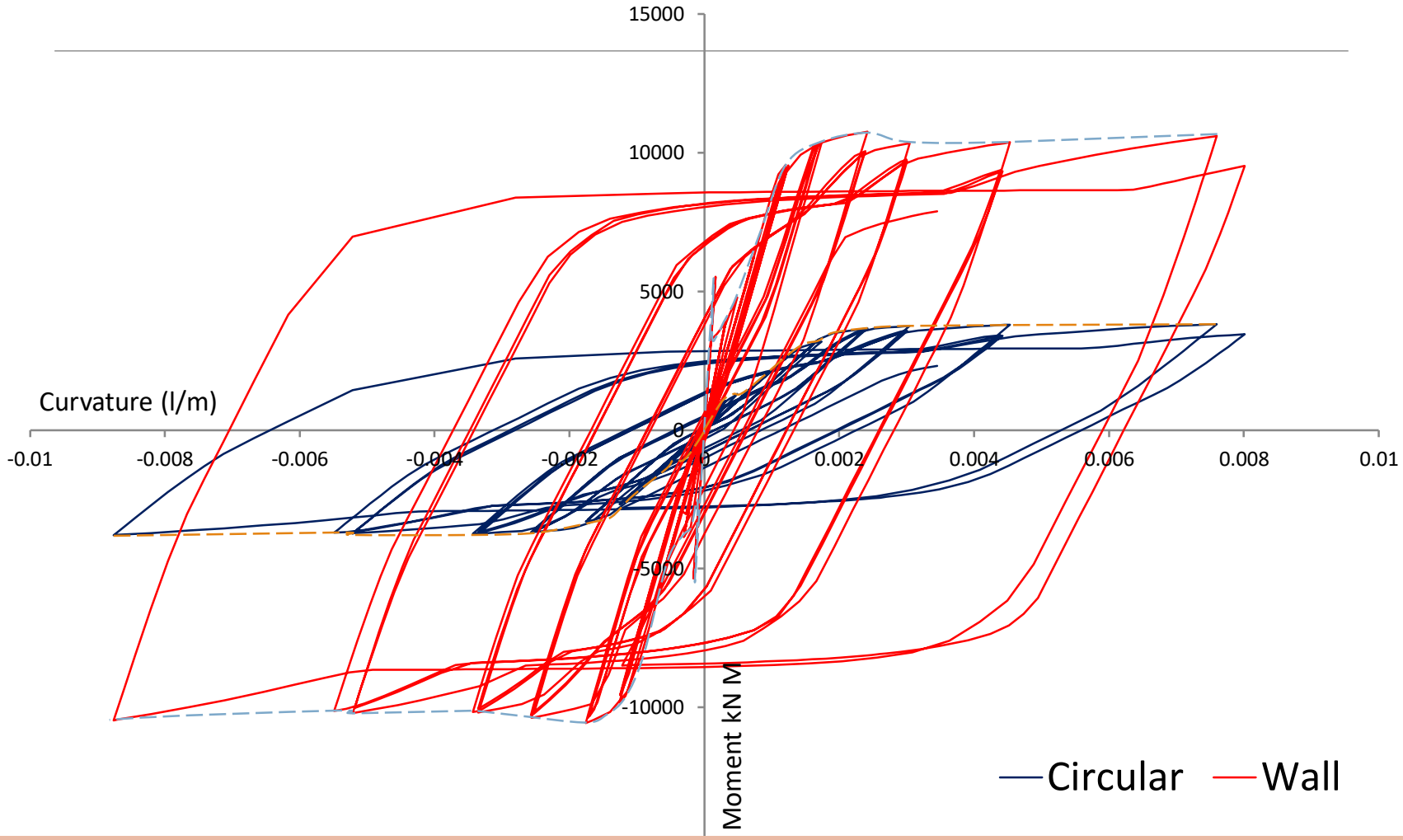




Beban siklik: model Mander



Perilaku momen-kurvatur pada beban siklik



KESIMPULAN

1. Tulangan pengekang memegang peranan signifikan dalam mempertahankan kapasitas kolom, dan mempertahankan daktilitas kolom
2. Perilaku daktilitas kurvatur pilar jembatan berdasarkan model Mander dan Scott berimpit dan sama.
3. Prediksi daktilitas kurvatur berdasarkan model Hoshikuma cenderung underestimate.
4. Simulasi beban sismik yang diterapkan pada Pilar jembatan (by Mandel model) menunjukkan bahwa pilar yang ditinjau mempunyai daktilitas yang memadai.

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Terima kasih

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Kepada Yth :
Bapak Prof. Dr. Ir. Antonius, MT.
Gurubesar Teknik Sipil, Unissula, Semarang
Di
Tempat

Assalamu'allaikum warohmatullahi wabarokatuh

Dengan Hormat,

Sehubungan dengan telah terlaksananya Acara Seminar Online BARRATAGA Seri ke 022, pada tanggal 17 Oktober 2020 dengan lancar dan sukses, maka Kami selaku Penyelenggara Acara mengucapkan Terimakasih kepada **Bapak Prof. Dr. Ir. Antonius, MT.** selaku Gurubesar Teknik Sipil, Unissula, Semarang yang telah menjadi narasumber dan memberikan materi dalam acara Seminar Online BARRATAGA ke 22.

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Wassalamualaikum warohmatullahi wabarokatuh.

Yogyakarta, 19 Oktober 2020

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