Tegangan dan regangan tekan beton ringan terkekang dan tidak terkekang menggunakan agregat kasar dari plastik polipropilen yang dilapis pasir = Compression stress and strain of unconfined and confined lightweight concrete using sand coated polypropylene coarse Aggregate

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Abstrak

Penelitian ini menyajikan model tegangan dan regangan dalam tekan pada spesimen beton terkekang dan tidak terkekang di dalam tekan yang menggunakan plastik Polypropilene sebagai pengganti agregat kasar. Hasil test tekan pada berbagai spesimen kolom pendek akan dikaji dan di analisa pada karakteristik tegangan-regangan, efek dari penulangan kekangan, dan peningkatan kemampuan gaya tekannya. Berdasarkan hasil test, tulangan kekang meningkatkan kuat tekan, serta daktilitas penampang. Identifikasi parametrik terhadap berbagai persamaan umum dari beton normal yang sudah ada digunakan terhadap hasil eksperimen untuk mendapatkan nilai parameter baru koefisien kekangan k1 dan k2 yang sesuai untuk beton ringan. Diagram tegangan-regangan untuk spesimen beton ringan kolom lingkaran dan persegi dari hasil eksperimen dibandingkan dengan diagram tegangan-regangan untuk beton normal yang umum dipakai, hasilnya menunjukkan kesesuaian yang baik.

.....Plastic production in the world ramped up to 322 million tons annual in 2015 with growth rate of 8.4% annually resulting large amount of plastic waste in nature. These plastic wastes are almost non-degradable in nature and polluting the environment in land and the sea. The use of recycled plastic aggregate for coarse aggregate in concrete is part of efforts to reduce environmental pollution by processing plastic grain in to coarse aggregate to substitute nature aggregate for light concrete. This study presents the analysis of concrete stress and strain model under compression of unconfined and confined concrete using Polypropilene plastic as substitution for coarse aggregate. To improve bonding between plastic aggregate and cement paste, this plastic aggregate is then coated with sands by placing and mixing the plastic aggregate with sands into a heater rotating cylinder. Test results of various specimens of short column will be reviewed and analysed in the stress and strain characteristics, effect of steel confinement, and performance improvement in compression. Based on experiment results, steel confinement increases compressive strength and ductility of the section. Parametric identification on established stress-strain model for normal concrete is used on the experimental results to obtain the new parameter values for confinement coefficient k1 and k2 that are suitable for this lightweight concrete. The stress-strain diagram for lightweight concrete of cylinder and square column specimen as resulted from experiment compared to the established stress-strain diagram used for normal concrete, the result indicates good agreement.