INTISARI

Kebutuhan energi di Indonesia dan di dunia terus meningkat, sementara sumber-sumber energi yang tersedia semakin menipis khususnya sumber energi yang berasal dari fosil, maka dari itu energi baru terbarukan yang merupakan energi yang tidak akan habis jika digunakan terus menerus semakin digencarkan perkembangannya. Energi terbarukan menjadi alternatif khususnya pembangkit listrik tenaga angin. Tujuan dari penelitan ini membuat model kincir angin kombinasi Giromill dan Savonius dengan sudu Giromill enam sudu, dengan variasi kemiringan sudut sudu Giromill 0°, 5°, dan -5°, mengetahui koefisien daya dengan *tip speed ratio* kincir angin yang diteliti.

Pada penelitian ini digunakan kincir angin kombinasi tipe Giromill dan Savonius perpaduan antara dua tipe kincir angin *vertical axis wind turbine* (VAWT). Penelitian ini menggunakan variasi kemiringan sudut sudu Giromill yaitu 0°, 5°, dan -5° pada kecepatan angin rata-rata 7,5 m/s serta variasi pembebanan. Penelitian ini dilakukan di Laboratorium Konversi Energi Teknik Mesin Universitas Sanata Dharma Yogyakarta.

Hasil penelitian menunjukan bahwa, pada model kincir angin kombinasi tipe Giromill dan Savonius pada variasi kemiringan sudut sudu Giromill 0° menghasilkan koefisien daya maksimal sebesar 11,94 % pada saat nilai *tip speed ratio* optimal sebesar 0,57, sedangkan pada variasi kemiringan sudut sudu Giromill 5° menghasilkan koefisien daya maksimal sebesar 3,52 % pada saat nilai *tip speed ratio* optimal sebesar 0,47 dan pada variasi yang terakhir kemiringan sudut sudu Giromill -5° yaitu 9,23 % pada saat nilai *tip speed ratio* optimal sebesar 0,43.

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Kata Kunci : Kincir angin kombinasi tipe Giromill dan Savonius, koefisien daya, *tip speed ratio*, *vertical axis wind turbine* (VAWT)

ABSTRACT

The need for energy in Indonesia and in the world continues to increase, while the available energy sources are increasingly depleting, especially energy sources derived from fosi, therefore new renewable energy, which is energy that will not run out if it is used continuously, is increasingly being intensified. Renewable energy is an alternative, especially wind power plants. The purpose of this research is to make a model of a combination of Giromill and Savonius windmills with six-blade Giromill blades, with variations of 0°, 5° and -5° angles of the angles of the Giromill blades. knowing the relationship between torque and windmill rotational speed and knowing the power coefficient with the *tip speed ratio* of the windmill under researched.

In this research, a combination type of Giromill and Savonius windmills, a combination of vertical axis wind turbine (VAWT) types, were used. This research uses a variation of the angle of the Giromill blade, that is 0°, 5° and -5° at an average wind speed of 7.5 m/s and variations in loading. This research was conducted in the Mechanical Engineering Energy Conversion Laboratory of Sanata Dharma University.

The results showed that, in the combination of Giromill and Savonius type windmills, the Giromill blade angle variation of 0 ° resulted in a maximum power coefficient of 11.94% when the optimum tip speed ratio value was 0.57, while the variation of Giromill blade angle tilt was 11.94%. 5 ° produces a maximum power coefficient of 3.52% when the optimal tip speed ratio is 0.47 and in the last variation the slope of the Giromill blade angle is -5 ° which is 9.23% when the optimal tip speed ratio is 0.43.

Keywords : combination of Giromill and Savonius type windmills, power coefficient, *tip speed ratio*, *vertical axis wind turbine* (VAWT).