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نمونه ترجمه مقاله رشته ---

شماره پروژه ترجمه

نمونه ترجمه

ترجمه مقاله ☒

ترجمه کتاب ☐

میدان‌های اسمی در مقابل جریانهای حلقوی بال موثر و تأثیر آنها بر عملکرد کاویتاسیون پروانه

چکیده

طراحان ملخ غالباً باید طرح خود را بر اساس توزیع جریان‌های حلقوی بر مدل اسمی بنا کنند زیرا توزیع کامل موثر در مدل واقعی در دسترس نیست. اثرات چنین داده‌های ناقصی بر روی عملکرد شیار ملخک

در این مقاله بررسی شده است. عملکرد کاویتاسیون پشت کشتی دو پروانه ارزیابی می‌شود، که موارد در نظر گرفته شده شامل پروانه‌هایی است که در مدل اسمی و توزیع جریان‌های حلقوی در مقیاس کامل و در توزیع جریان‌های حلقوی موثر که در مدل اسمی و مدل کامل کار می‌کنند. روش تجزیه و تحلیل، ترکیبی از RANS (معادلات ناویر-استوکس به روش میانگین‌گیری رینولدز) برای بدنه کشتی و یک روش پانل برای جریان پروانه (ملخ) است. تاثیر کاویتاسیون ورق حفره به دلیل توزیع‌های مختلف جریان‌های حلقوی برای یک کشتی معمولی کامل بررسی شده است. نتایج اختلاف معنی داری را در میزان کاویتاسیون، حجم و پالس‌های فشار بدنه نشان می‌دهد.

متن اصلی (انگلیسی) در صفحه بعدی آمده است ...

Article

Nominal vs. Effective Wake Fields and Their Influence on Propeller Cavitation Performance

Pelle Bo Regener [1,*], Yasaman Mirsadraee [1,2] and Poul Andersen [1]

1. Department of Mechanical Engineering, Technical University of Denmark, Nils Koppels Allé 403, 2800 Kgs. Lyngby, Denmark; yasmir@mek.dtu.dk (Y.M.); pa@mek.dtu.dk (P.A.)
2. MAN Diesel & Turbo, Engineering and R&D Propulsion, 2450 København SV, Denmark

* Correspondence: pboreg@mek.dtu.dk

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Abstract: Propeller designers often need to base their design on the nominal model scale wake distribution because the effective full scale distribution is not available. The effects of such incomplete design data on cavitation performance are examined in this paper. The behind-ship cavitation performance of two propellers is evaluated, where the cases considered include propellers operating in the nominal model and full scale wake distributions and in the effective wake distribution, also in the model and full scale. The method for the analyses is a combination of RANS for the ship hull and a panel method for the propeller flow, with a coupling of the two for the interaction of ship and propeller flows. The effect on sheet cavitation due to the different wake distributions is examined for a typical full-form ship. Results show considerable differences in cavitation extent, volume, and hull pressure pulses.

Keywords: propeller cavitation; wake scaling; effective wake; RANS-BEM coupling

behind the ship adds to the complexity of the problem because the propeller–hull interaction modifies the inflow field to the propeller as well.

Single-screw ship wake fields are usually characterized by a strongly non-uniform distribution of velocities with a wake peak at the 12 o'clock position, where the axial velocities are particularly low. This means that the blade sections of a propeller operating behind the ship experience strong variations in angle of attack. As the hydrostatic pressure acting on the blade reaches its minimum at the same time as the blade experiences high angles of attack while passing through the wake peak, this region of the wake field is particularly critical in terms of cavitation.

Analyzing the different factors influencing propeller cavitation and related erosion and vibration issues, an ITTC propulsion committee [1] pointed out that, for large container ships with highly-loaded propellers, the wake field characteristics—and not propeller geometry details—are the key to achieving decent propeller cavitation performance.

Especially the depth of the wake peak, i.e., the difference between the lowest axial velocity occurring there and the maximum velocity in the propeller disk, is of decisive importance for the cavitation performance of a propeller behind the ship. When uniformly scaling the nominal wake velocities to match the effective wake fraction, the width and depth of the wake peak are unlikely to be represented properly.

As this has been known for many years, different methods exist for estimating the full scale wake field of a ship, covering a rather wide range of complexity and sophistication. Usually the nominal wake field, measured at model scale, serves as input for these methods. A review of the most commonly used scaling methods was carried out some years ago by an ITTC specialist committee on wake field scaling [2]. That report mentions the simplest form of wake scaling, where one only scales the wake field by changing the magnitude of the velocities uniformly to match a target wake fraction, as already described above. In that case, the shape of the isolines of the input field (usually the measured nominal wake field) remains unchanged. Therefore, even calling this procedure a "scaling method" is questionable. While the shortcomings of this approach are well-known, it still appears to be commonly used for its simplicity.