Department of Applied Mathematics, University of Western Ontario, London, Ontario, Canada

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The axisymmetric approach of two unequal spheres has been ... has been studied by ...

(1969), Hansford (1970) and Jeffrey (1982) with the aim of calcul...

forces exerted by the spheres on the fluid. These forces are not ...

however, because the analysis of the properties of suspens...

stresslets of the spheres, defined by Batchelor (1970)

$$S = -\int_A [\tfrac{1}{2}(\mathbf{x}'\boldsymbol{\sigma}\cdot\mathbf{n} + \boldsymbol{\sigma}\cdot\mathbf{n}\mathbf{x}') - \tfrac{1}{3}\mathbf{I}\mathbf{x}'\cdot\boldsymbol{\sigma}\cdot\mathbf{n}]\, \mathrm{d}A. \quad (1.1)$$

The vector $\mathbf{x}'$ is drawn from the centre of the sphere. Various authors h... ...ave defined resistance ...

... 1984b; ...

of ψ. This is not so for the stresslet, however. For its calculation [illegible]

[illegible] and [illegible] non-axisymmetric cases is that

that the Reynolds equation for the pressure is simpler in the [illegible]

whereas O'Neill and Stewartson could [illegible]

[illegible]

$U_- = 2 \ldots$ 0, we can reduce the stresslets to expressions containing the scalar functions

[illegible]

...RES

We shall suppose that the sphere of radius a approaches the other, which is at rest, at ... velocity U. The scale velocity $\mathscr{V}$ is then U and the boundary conditions to be applied on sphere a are:

$$U = 0 \quad \text{and} \quad W = -1 \quad \text{on } Z = H_1 + \varepsilon \tfrac{1}{8} R^4,$$

[illegible]

$U = 0$ $W = \ldots$ [illegible]

Since [illegible]

$$U(R, Z = H_1 + \varepsilon^{\frac{3}{2}} R^*) = U_1(R, H_1) + \varepsilon U_2(R, H_1) + \varepsilon^{\frac{3}{2}} R^* [\partial U_1/\partial Z]_{Z=H_1},$$

we can equate powers of ε to find:

[illegible]

… of the stationary sphere:

[illegible]

...erest, in passing, concerns the way these results were obtained using computer ... A point of ... [illegible]

... conditions into stretched coordinates, we obtain:

$$W = \ldots 1 - \varepsilon(1 - z) \quad \text{and} \quad U = -\tfrac{1}{2}\varepsilon^{1/2} R.$$

Therefore the boundary conditions on the deforming sphere become

... are the same as in the previous ... ng sphere section. The method of solution is also the same and again the pressure when R is large goes as $O(R^{-4}) + \varepsilon O(R^{-2})$. Since this flow problem has not been solved before, we have both the force and the stresslet to calculate. However, the force calculation does not give any new results, because the reciprocal theorem shows that the forces are proportional to ... X_{11}^{A} ... (the resistance matrix is symmetric). It does, of course, provide a second calculation of ...

singular terms in Y^{M} are the same as those in Y^{M}, but we can see that in general this is

[illegible]

Before we proceed to calculate the $O(1)$ constants, we wish to extend the results (2.11)–(2.13) in the special case $\lambda = 1$ using a plausible argument. We know that the functions $X_{\alpha\beta}$ contain singular terms in ε^{-1}, $\ln \varepsilon$ and $\varepsilon \ln \varepsilon$ and we expect that the new functions studied here will be the same. We also note from (2.11)–(2.14) that the coefficients of the ε^{-1} and $\ln \varepsilon$ terms of X^G_{11} and X^G_{12} are equal. If we suppose that this will be true for the $\varepsilon \ln \varepsilon$ terms also, we can remove X^G_{12} from (2.10) and the equation then determines X^G_{11} [illegible]

[illegible]

The constants G_{11} and K_1 will be obtained from [illegible]

$$X^G_{11} = \frac{3}{8}\frac{1}{\varepsilon} - \frac{27}{80} \ln \varepsilon + [illegible] - \frac{117}{560}\,\varepsilon \ln \varepsilon + [illegible] \tag{4.9}$$

The same considerations and assumptions lead to:

$$X^M_{11} = \frac{2}{5}\left(1+\frac{1}{2}\varepsilon\right)X^G_{11} \; [illegible]$$

[illegible]

Table 1. Convergence properties of series for G^X and [illegible]

n	without g_6	with g_6	without g_6	with g_6
100	0.71927	0.71631	−0.14194	−0.14493
200	0.71858	0.71708	−0.14424	−0.14574
300	[illegible]	[illegible]	[illegible]	[illegible]

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